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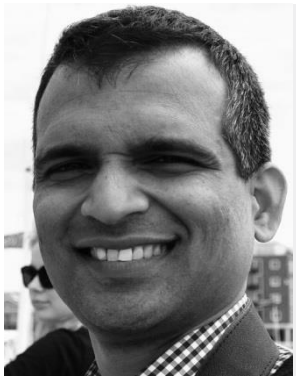
ABOUT APTA CONSULTING

APTA provides Financial modelling, Petroleum Economics evaluation & analysis, and Excel training for business modelling and data analysis to range of clients. Our clients range from blue chip to small enterprises and individuals. Our clients have access to high quality, cost effective modelling support delivered by team of experts around the world.

APTA FINANCIAL MODELLING TEAM

APTA's dedicated Oil & Gas modeling team is led by Santosh Singh. Santosh has more than 12 years of industry experience. With a technical background in drilling engineering and further qualification in Finance and Economics, he has worked in a number of major technical and commercial functions and gained extensive experience in economics evaluation, business development and commercial agreements.

Santosh's commercial valuation and analysis experience covers Africa, Asia, and Eurasia to name a few. He has a proven ability in the fiscal regime modelling, investment analysis, and providing high quality support to management for the strategic investment decisions.



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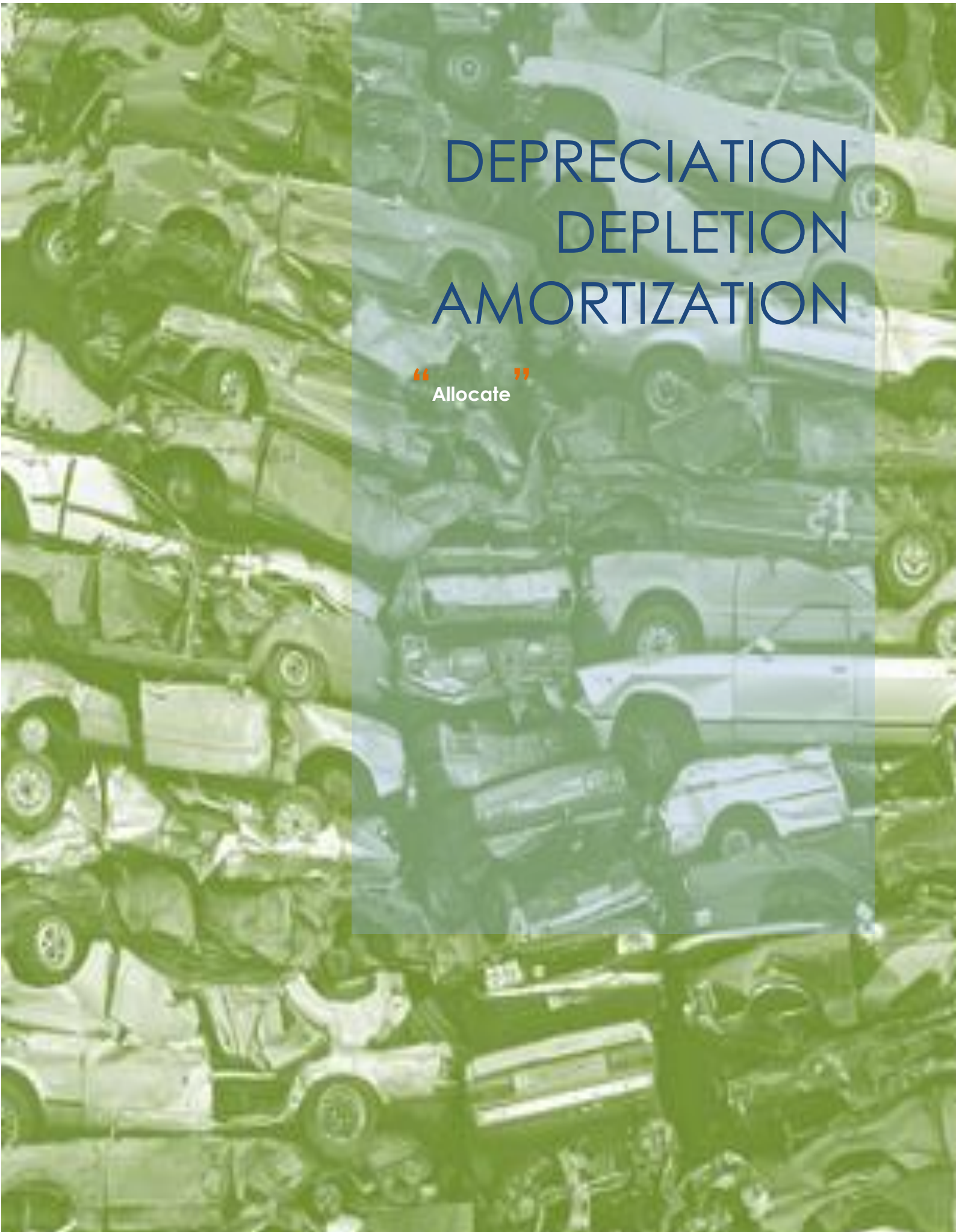

DEPRECIATION DEPLETION AMORTIZATION

"Allocate"

DD&A

DD&A stands for depreciation, depletion and amortization. These are terms associated with tangible assets, resources, and intangible assets in that order.

DD&A is required to be calculated for tax relief allowance, sometime cost recovery and at times for royalty calculations. It's almost always required for tax computation, irrespective of industry and across the globe.

Why do we need to calculate DD&A? The economic rationale is explained below.

For any business to generate money, it has to first put up and asset in place. The usages of asset then generate profit or money for the business. This is true for all types of businesses whether its manufacturing or knowledge based consulting services. For a manufacturing company, its plants, production facility, equipment etc. are its assets. For a knowledge based company, the knowledge and skill set of its consultants and the image of the company are its primary asset.

To put an asset in place one need to spend some money on it upfront (in most cases). When we spend money on an asset we call it Capital expenditure (CAPEX). Recall in the chapter on Capital Budgeting we differentiated between Capital expenditure and Operational expenditure. Capital expenditure creates an asset. An asset in an accounting sense is an investment which creates value not just in period of its investment but over many periods to come in future as well.

Operating expenditure (OPEX) on the other hand also involves spending. But this spending helps to generate value only in one period, the period of its spent.

So what has all this to do with the tax calculation or cost recovery?

You will see in a moment I am heading to. Let's take an example, a very simple one to nail down the concept. Let's say you start a business of cab rentals. You buy one car and people come to you for renting the car. The car renter in return pays the car rental amount for the use of the car. Let's say the car cost you $50,000 on 1st Jan 20X0 (the first day of your business). Over the year your rental business generated $20,000 in revenue. Your annual

expense in maintaining the rental office was $5,000. At the end of the year, you need to file your tax return for the business. Assume tax rate is 30% on the profit.

The question is how much you need to pay in tax to the tax authorities? What is your profit for the year? What's your cash flow for the year?

So you calculate your pre-tax profit first as:

= Gross rental income from car – office expense – cost to buy the car
= $20,000 - $10,000 - $50,000
= - $40,000

And you conclude that you made a loss of $40,000 and so you don't owe any tax to the tax authorities.

But the tax authorities called you and ask for the tax or pay fine! Puzzled by this, you sought an explanation as how come you owe a tax when you actually made a loss?

The tax authorities clarified that as per the tax code and accounting rules you seems to have made a profit. Below is the taxable income as per them:

Total rental income = $20,000
Less Office expense = $10,000
Less Depreciation for the car = $5000
Taxable Income (or Taxable Profit) = $20,000 -$10,000 - $5,000 = $5,000

So 30% tax needs to be paid on a taxable profit of $5,000 for the year.

Tax liability = 30% x $5,000 = $1, 5000

So where did you go wrong in calculating you taxable profit and why? What you calculated was not your taxable profit but **pre-tax cash flow. That was the actual cash by which your bank would be affected pre-tax.** Taxable profit is an accounting term and may or may not match with cash flows.

Here is the logic of depreciation. When you bought the car in the beginning of the year for running your rental business, you actually created an asset. The car helped generate revenue of $20,000 in first year of its life. It will generate more income in future too. This is not the only year that the car will be used for the business. Therefore we cannot deduct the entire value of the car in the first year. We can deduct a portion of the car's value against this year revenue. Principally it means we need to allocate the value of car over

multiple periods in which it will be in usages. In each period we will deduct the allocated value of the car from that period's revenue.

Depreciation is therefore an accounting method to account for portion of the value that has been used up in generating the revenue during a particular accounting period. It spreads the capital cost (assets) over a period of time ("useful life" of the asset). This useful life of the asset is in most case pre-determined by accounting rules.

You can also look at depreciation (depletion and amortizations) as means of recovering capital investment from the revenue.

Operating costs are expensed, thereby meaning they can be 'recovered' 100% in the same period of their investment (or in plain language when they are incurred) unlike Capital investment. This is so because operating expenditure by definition used up in generating revenue in same period of spends. It does not create revenue in future periods, unlike Capital spends.

Just one more point of caution though, does not assume that big ticket items are generally Capital expenditures. Whether expenditure is Capital or not depends on its usages.

For example if you run a car dealership, the cars that you buy and sell every now and then cannot be categories as Capital expenditure. It's your inventory! The cost involved will be expensed in the period when the car gets sold as costs of goods sold. Hope you follow the distinction now.

Having learnt the concept and economic logic of depreciation let's move on to depletion and amortizations. Actually mathematically they all are the same, spreading of the cost of the asset over the useful life of the asset. Assets or Capital is generally classified as 'Tangible', 'Intangible', or natural resources/rights for the exploitation of natural resources. When its **'Tangible'** asset the spreading of cost over useful life of that asset is termed **'Depreciation'**. In case of '**Intangible'** assets, it's called **'Amortization'**. For **natural resources**, its termed as **'Depletion'.**

Building, machinery, pipeline, facilities, and platforms are example of 'Tangible' assets. Services cost, drilling cost, some R&D expenditure, trademarks, patents are example of 'Intangible' assets. Cost of acquiring exploration or development license or Bonus paid for the mineral rights are assets that may be recovered through 'Depletion'.

Tax calculation allows certain costs to be deducted (or cost recovered) against the gross revenue. Generally such allowable deductions are called 'allowance'. In calculating allowance, instead of entire Capital cost, only apportion of capital cost is permitted. Ideally

that portion of allowed capital cost (depreciation) should reflects the usages of the capital/asset in that specific period. *The depreciation amount included in the allowance for tax relief is usually called "Capital Allowance".*

One more thing before we show you how to calculate DD&A. Depreciation can start from the day the Capital expenditure has been incurred(asset purchased) or from the date Asset is actually put to use or from the date of Oil production start (First Oil date)

METHODS OF COMPUTING DD&A

Straight Line

Straight line method is the simplest one to calculate. It allocates the Capital cost equally over the life of the asset. The life of the asset is decided by tax code/asset type. Depreciation value will be equal over all periods in this case.

For example let's assume certain facility cost of an offshore project is $103 million. Assume the useful life is 20 years. At the end of useful life the salvage value of the facilities is $3 million. Salvage value is the value of the asset at the end of its useful life (amount that you receive by selling or scrapping the asset in the end). Implicitly the asset value that got utilized over its 20 year period is $100 million (= $103 million - $3 million). Under straight line method, we need to allocate equal value in each period of 20 years. Thus the allocated value usage each year is $5 million (= $100million/20 years).

Straight Line Depreciation:

$$Depreciation = \frac{(Initial\ Capex - Salvage\ Value)}{Useful\ Life}$$

In the example above, the value of asset on the balance Sheet at the end of first account period will be $98 million (=$103million - $5 million gone as depreciation).

A worked out example is shown is below in tabular format. Capex expenditure incurred in different period is shown in the first row. Total Capex is $600 million (MM$ in petroleum economics stands for million $, M = thousand, MM thus stands for million).Total salvage value is $30 million. Thus total depreciable value is $570 million only. All capex is assumed to be depreciated over 5 years, straight line, meaning equal allocation over a 5 year period. We have also assumed that Capex can be depreciated only after production. In the example we assumed production starts in period 3. Depreciable value of a Capex is Total Capex less Salvage value of that Capex.

	UNIT	Total	1	2	3	4	5	6	7	8
Capex	MM$	600	100	400		100				
Salvage Value	MM$	30	10			20				
Depreciation Start			FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Depreciable Value	MM$	570	90	400	0	80	0	0	0	0
Depreciable Capex - Pre Prod	MM$	490	90	490	0	0	0	0	0	0
Depreciation Pool – Additions	MM$	570	0	0	490	80	0	0	0	0
Depreciation	MM$	570	0	0	98	114	114	114	114	16

Declining Balance

In this method, instead of allocating the equal value usage of the asset over its useful life, *a fixed percentage of the remaining* value of the asset is allocated in a given accounting period. Let's repeat the same example as before. The asset is same $103 million facility with $ 3 million as salvage value. But the asset value is depreciated 5% of the remaining asset value each year.

The math works like this: At the end of first year amount depreciated is $5 million (= 5% x ($103 - $3) million). Remaining asset value at the end of first year is $98million as in Straight Line method. At the 2nd year depreciation will be= 5% x { ($103 - $3) - $5}.

Declining Balance Depreciation:

$$= ((Initial\ Capex - Salvage\ Value) - Cumulative\ Depreciation\ )x\ Fixed\ Rate$$

If you review the formula for Declining Balance depreciation, the value of asset will never reach to zero, i.e. never fully depreciated. In this method depreciation charges are higher initially and gets smaller as smaller as asset base keeps getting smaller and smaller. They are thus 'front end loaded'.

Let's repeat the same example that we did for straight line depreciation but using declining balance method. In this case we assume depreciation rate of 20% declining balance.

	UNIT	Total	1	2	3	4	5	6	7	8
Capex	MM$	600	100	400		100				
Salvage Value	MM$	30	10			20				
Depreciation Start			FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Depreciable Value	MM$	570	90	400	0	80	0	0	0	0
Depreciable Capex - Pre Prod	MM$	490	90	490	0	0	0	0	0	0
Depreciation Pool – Additions	MM$	570	0	0	490	80	0	0	0	0
Depreciation Pool - Opening Balance	MM$		0	0	490	472	378	302	242	193
Depreciation	MM$	471	0	0	98	94	76	60	48	39
Depreciation Pool - Closing Balance	MM$	99	0	0	392	378	302	242	193	155

Depreciation Pool additions as shown in table above is the amount of depreciable Capex added in the depreciation pool during each period. Amount depreciated will be 20% of the amount in the '*Depreciation Pool – Opening Balance*'. Depreciation Pool – Opening Balance is the amount of Capex in the depreciation pool that is yet to be depreciated (closing balance of previous period) and the addition of current period depreciable Capex in the depreciation pool.

As noted above, the depreciation pool balance never reaches to zero, i.e. Capex will never be depreciated fully in this method.

Double Declining Balance

Exactly same as Declining Balance method of depreciation. Only the rate is double of what is specified. So if the rate says 5%, then use 10% to depreciate.

At the end of first year amount depreciated is $10 million (= 2x 5% x ($103 - $3) million). Remaining asset value at the end of first year is $93million. At the 2nd year depreciation will be= (2 x 5%) x {($103 - $3) - $10}.

The remaining value of the asset each year will keep falling and eventually the depreciation amount calculated in a given period will fall below amount if calculated by straight line method. From that point onward the depreciation method will switch from double declining to straight line method.

For example if the double declining rate is 5%, the actual depreciation will be based on 10% of the remaining asset value. That result will be compared with the straight line

depreciation value in each period. Since the declining rate is 5%, that is equivalent to 1/5% = 20 years. So straight line depreciation will be fixed for each year and = $5 million for each year (assume the same facility asset of $103 million with $3 million salvage value). Once the depreciation in a period based on 10% falls below $ 5 million, we switch to straight line method.

Unit of Production

Generally referred to as UOP method of depreciation. In this method, the value of asset allocated to a given period is dependent on the amount of production in the period as a proportion to the total possible production over life of field/project.

For e.g. if production in a period is equal to 7% of the total reserves, the amount of depreciation in that period will be 7% of the asset value. Assuming asset data same as before previous, the depreciation in this particular period will be $7 million (= 7% x ($103 - $3million)). If the production in the next period is say 8%, then amount of depreciation in that period will be $8 million.

$$UOP\ Depreciation =$$

$$(Initial\ Capex - Salvage\ Value)\ x\ \frac{current\ period\ production}{Total\ production\ over\ field\ life}$$

Or

$$(Initial\ Capex - Salvage\ Value - Cumulative\ Depreciation)\ x\ \frac{current\ period\ production}{Remaining\ total\ production\ over\ field\ life}$$

They are thus 'front end loaded'.

See an example work out below of UOP method. All inputs are same as before. Only depreciation rate has changed. Depreciation rate is based on UOP or unit of production as explained in formula above. Note that under UOP method Capex is fully depreciated, unlike declining or double declining method. The example is shown below.

	UNIT	Total	1	2	3	4	5	6	7	8
Capex	MM$	600	100	400		100				
Salvage Value	MM$	30	10			20				
Production	MMBbl	100			10	25	20	20	15	10
Depreciation Start			FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Remaining Reserve	MMBbl		100	100	100	90	65	45	25	10
Depreciation Rate			0%	0%	10%	28%	31%	44%	60%	100%
Depreciable Value	MM$	570	90	400	0	80	0	0	0	0
Depreciable Capex - Pre Prod	MM$	490	90	490	0	0	0	0	0	0
Depreciation Pool – Additions	MM$	570	0	0	490	80	0	0	0	0
Depreciation Pool - Opening Balance	MM$		90	490	490	521	376	261	145	58
Depreciation	MM$	570	0	0	49	145	116	116	87	58
Depreciation Pool - Closing Balance	MM$	0	90	490	441	376	261	145	58	0