

## Rules of the Game: Taxes, Depreciation and Regulation

*The zoning law of 1916 – the nation’s first – regulated the bulk of buildings, their height, and their uses. It divided the city into three zones – residential, business, and unrestricted – and empowered the Board of Estimate to regulate the use, height, and bulk of every building on every street in the city, depending upon what zone the block was in.<sup>1</sup>*

### Introduction

Government policies affect how projects are conceived, what kinds of projects can or cannot be implemented, where projects can or cannot be built, how projects can or cannot be constructed, and how successful they will be once they are implemented. The most important policies relate to taxes, land use, safety, and the environment. These policies are in effect “rules of the game” that limit what kinds of developments can be pursued and influence how the players tabulate their scores, i.e. their profits and their ability to complete projects. The players – real estate companies, entrepreneurs, public agencies, infrastructure operators, investors, banks – still have to figure out what they want to do and how to do it, but they must abide by the rules that have been established. Changing the rules will change the way that the game is played, and the rules can be adjusted to promote projects that are believed to provide economic, social, environmental or sustainability benefits for the public.

Taxes are relevant to project evaluation because taxes affect cash flows. If the goal is to maximize the net present value of cash flows, then it is necessary to consider taxes. Moreover, local, state and federal governments may impose taxes or offer tax credits in order to discourage or promote certain kinds of development, so it is important to be able to comprehend the effects of tax policy on project design and evaluation. Different kinds of taxes may apply to the profits from constructing, operating, and selling infrastructure, so it is necessary to understand how tax laws categorize each type of expenditure and each type of revenue. Accounting rules established by law or by regulation determine what kinds of expenses are treated as current expenses and what kinds are treated as capital expenditures. Arcane rules may determine whether money spent on rehabilitating infrastructure is treated as operating expense – which is fully deductible as an expense in the current year – or a capital expense that can only be deducted from taxable income over a period of many years.

Zoning is the major tool used by local governments to guide land use. Zoning restrictions limit the types of development that may be pursued in certain locations, such as restricting one area to residential use while specifying another area as suitable for industrial use. Zoning restrictions may also limit the size or height of buildings or the location of buildings on a site.

Building codes define what types of construction materials, designs, and methods can be utilized. Regulations can be established to reduce risks during construction or operation or decommissioning of a project. New technologies, such as the use of plastic pipes for plumbing, had to be approved for use in building codes before they could be widely used. In transportation, governments may create design standards for highways and bridges that serve a similar function, i.e. promotion of safety during construction and operation. Likewise, governments may establish standards for the construction and operation of water resource systems and for other types of infrastructure.

Environmental restrictions restrict the nature, location and cost of projects. Land use regulations may include restrictions on development in or near wetlands or waterways. There may be restrictions on the types of materials that are used in construction, such as laws that prohibit the use of asbestos because of the link between asbestos and lung cancer. There may also be restrictions that limit the types of work that can be undertaken at night, so as to limit the

---

<sup>1</sup> New York City implemented zoning to avoid turning Manhattan into dark canyons, with skyscrapers towering above and keeping light and fresh air away from city streets. John Tauranac, **The Empire State Building: The Making of a Landmark**, St. Martin’s Griffin, NY, NY, 1995, p. 55

disruption to neighborhoods. Contractors may be required to take special precautions to prevent dust and run-off from construction sites from contaminating nearby areas.

## **Depreciation and Taxes**

Taxes and financial statements are structured according to strict guidelines known as generally accepted accounting principles. By following these guidelines, it is possible to define terms such as profit and return on investment (ROI). Profit, ROI and other measures used in financial statements are critical because investors and analysts use these measures in judging whether or not to invest in a company. The financial markets rely upon the validity and the comparability of data produced by companies in their financial statements. Therefore, if a company sells stocks or bonds, it is required to use accepted accounting principles in preparing those statements, as well as in preparing their tax returns.

Since taxes are large cash flows, they cannot be ignored when evaluating projects. And, since the amount of taxes to be paid depends upon accounting rules, it is necessary to understand some basic concepts of accounting. One of the most important rules is that capital expenditures cannot be treated as a current expense, but instead must be spread out over many years as a depreciation expense.

For example, operating expenses for a building include such things as electricity for lights, oil for heat and wages for the people who manage and maintain the building. At the end of each week or month, the owner of the building knows how much was spent on electricity, oil and wages: the lights worked, the building was warm, the rooms and hallways were cleaned, and rents were collected. The money was spent, the work was done, and now it's time to do it again in the next month.

The capital expenditures that were required to create the building are entirely different. The building may have cost \$10 million to construct, and when the construction was complete the owner may have a mortgage for \$10 million – but the owner also has a building. Now, the building may or may not be worth \$10 million, because the value of the building depends upon the real estate market, the condition of the building, and the annual rent payments, not the cost of the building. However, the accounting assumption is that if the building cost \$10 million to construct, then the building is an asset worth \$10 million when it is put into service. The owners may have spent \$10 million, but they have created an asset worth \$10 million, so they have not had any loss in value.

The same concept could be applied to the purchase of a car for \$20,000, the construction of a bus terminal for \$20 million, or the construction of a vast pipeline for \$2 billion. The money may have been spent, but an asset has been created, and accountants will record the book value of the asset as being equal to the investment cost. So right at the beginning of the life of the asset we have an accounting assumption that is accepted, even though it most likely is wrong. The car may be worth only \$15,000 as soon as we drive it out of the dealer's lot; the bus terminal may only be worth \$10 million to anyone other than the bus company, while it may be worth \$30 million to the bus company. We don't quibble about this discrepancy between book value and real value, not because we are so flexible in our thinking, but because the tax collector tells us that we will use the accountant's book value as one factor in computing the taxes we owe. If you want to use the real value of the asset in your own internal reporting, that is fine; just don't confuse the book value and the real value when doing your taxes. Also, although we really do know what we paid for the car, the bus terminal and the pipeline, we probably do not know what they really are worth today. So, it will be convenient for us, as well as the tax collector, to use the accounting assumption.

Now we have a place to start for figuring out depreciation, namely the book value of the asset. We could perhaps now try to determine how much the asset deteriorates each year, so we could use the actual decline in life as the amount of depreciation. This turns out to be a difficult task. What is the expected life of a car? How much of the life of a car is consumed by time? By usage? By exposure to rain and snow? It is possible to do some engineering analyses to answer questions like these, but the tangle of assumptions and analyses will quickly become quite thick. For internal purposes, say for a rental car company, it might be a very good thing to understand the life of cars based upon the kind of usage they receive and whether they are based in the heat of Florida or the snow and ice of Minnesota. For most

companies, however, it would probably be a difficult calculation with little or no benefit to management; a plan to replace company cars after five years will be sufficient for them. However, all companies will have to use an accepted methodology to account for depreciation of their cars.

At this point, we need three more accounting assumptions to make it easy to estimate depreciation:

- The life of the asset
- The salvage value of the asset (which would not include the value of land, as land is generally assumed not to depreciate in value)
- The depreciation rate over the life of the asset

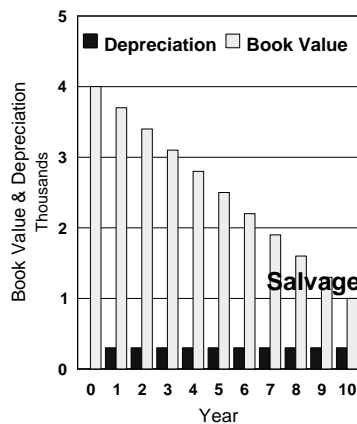
The life of the asset could be defined based upon some sort of study of past experience – or it could be defined by the tax collector. A car, for example, might be assumed to have a life of ten years, while a bus terminal or a pipeline might be assumed to have a life of thirty or fifty years. The salvage value is the remaining value of the asset at the end of its life. For a car, the salvage value might be the scrap value of the car, which might be assumed to be 5% of the original purchase price. For a bus terminal or a pipeline, the salvage value might be assumed to be the book value of the land (i.e. the purchase price of the land required for the project) or a percentage of the investment cost. The accounting principle is that depreciation causes the book value of an asset to decline from the original investment cost to its salvage value at the end of the asset’s life. The depreciation could most easily be assumed to proceed at a constant rate over the life of the asset:

(Eq. 1)            Annual Depreciation = (Investment – Salvage)/Life

If the life of a \$4 million asset is ten years and the salvage value is \$1 million, then the asset would depreciate in value of \$0.3 million per year (Figure 1). The book value declines in a straight line from \$4 million to \$1 million.

## Straight Line Depreciation

- $d_k = (B - S)/N$
- $d_k = \text{Deprec. year } k$
- $B = \text{Cost Basis}$
- $S = \text{salvage value}$
- $N = \text{life}$
- Book value year  $k = B - k \cdot d_k$



Other approaches to depreciation can be imagined. One might argue that depreciation should be greater at first, to reflect the immediate loss in value of cars and some other assets. Once we have accepted that the accounting assumptions may be tied to convenience rather than reality, it is easy to come up with some alternatives. For example, instead of assuming a fixed amount of depreciation over the life of the asset, it would be possible each year to take a fixed percentage (P%) of the remaining book value over the life of the asset, without considering the salvage value at all.

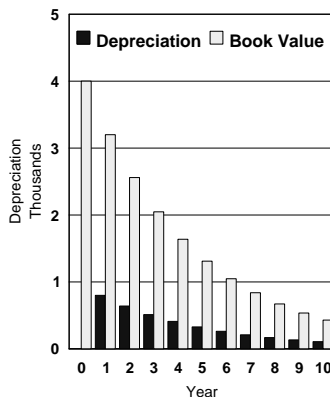
- (Eq. 2) First year depreciation = (P%)(Investment)
- (Eq. 3) Reduced book value at end of first year = (1-P%)(Investment)
- (Eq. 4) Second year depreciation = (P%)(1-P%)(Investment)
- (Eq. 5) Year N depreciation = P% (Book value at end of year N-1)

These equations can readily be used to create a table in a spreadsheet that shows the initial book value in each year, the amount of depreciation allowed in that year, and the final book value.

With the same example used above, suppose the book value was depreciated by twice the amount allowed under straight line depreciation, which would be 20% of the remaining value each year for ten years. This method is called **double declining balance depreciation**, because the amount of depreciation allowed in the first year is double the amount allowed under straight line depreciation. The book value would decline by (0.20) \$4 million = \$800,000 in the first year. In the second year, the initial book value would therefore be \$3.2 million, and it would decline by (0.20) \$3.2 million = \$640,000 in the second year. Each subsequent year the amount of the depreciation would decline by a factor of 0.80. This approach is higher using the double declining balance approach is better.

## Declining Balance Depreciation

- $d_1 = B \cdot R$
- $d_k = B \cdot (1-R)^{k-1} \cdot R$
- B = Cost Basis
- $BV_k = B \cdot (1-R)^k$
- $BV_N = B \cdot (1-R)^N$
- Salvage value is not included directly
- $R = 1/N$  is straight line
- $R = 2/N$  is double declining balance



known as **declining balance depreciation**.

**ation**

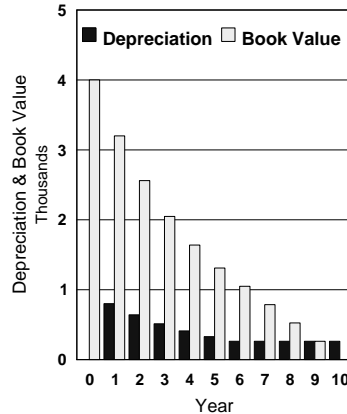
A related approach is to use the declining balance approach only so long as that approach results in depreciation greater than the straight-line approach. Using this method, it is necessary to compare the depreciation for the declining balance approach with the depreciation that would be obtained by switching to straight-line depreciation of the remaining book value over the remaining life. Once the straight line approach provides greater depreciation, switch to that approach and continue over the life of the project. Once again, this method can readily be examined in a spreadsheet:

- Start by using the declining balance in the first year.
- For the second year, calculate depreciation using two methods:
  - Continue using the declining balance method.
  - Determine the depreciation of the book value at the beginning of the year using the straight line method (Eq. 1).
- If the depreciation under the straight line method is higher than that allowed under the declining balance method, then switch to that method; if not, then continue to use the declining balance method.

annual depreciation for the three to accelerate depreciation of an

## Declining Balance Depreciation with Switchover to Straight-Line Method

- Start with double declining balance
- Calculate the annual depreciation for the remaining balance using straight-line method (for the current book value and the remaining life)
- Switch to straight line when that method gives more depreciation



reciation in Year 6

**Table 1 Three Methods of Depreciating an Asset With Initial Book Value of \$4 Million and a Life of Ten Years (\$ millions)**

Year	Straight Line		Double Declining Balance		Double Declining Balance Reverting to Straight Line	
	Book Value at Beginning of Year	Depreciation	Book Value at Beginning of Year	Depreciation	Book Value at Beginning of Year	Depreciation
1	\$4.000	\$0.300	\$4.000	\$0.800	\$4.000	\$0.800
2	\$3.700	\$0.300	\$3.200	\$0.640	\$3.200	\$0.640
3	\$3.400	\$0.300	\$2.560	\$0.512	\$2.560	\$0.512
4	\$3.100	\$0.300	\$2.048	\$0.410	\$2.048	\$0.410
5	\$2.800	\$0.300	\$1.638	\$0.328	\$1.638	\$0.328
6	\$2.500	\$0.300	\$1.311	\$0.262	\$1.311	\$0.2621
7	\$2.200	\$0.300	\$1.049	\$0.210	\$1.049	\$0.2621
8	\$1.900	\$0.300	\$0.839	\$0.168	\$0.786	\$0.2621
9	\$1.600	\$0.300	\$0.671	\$0.134	\$0.524	\$0.2621
10	\$1.300	\$0.300	\$0.537	\$0.107	\$0.262	\$0.2621
11	\$1.000		\$0.429		\$0.000	

One might think that these rather arbitrary methods would require a great deal of bookkeeping, plus considerable trouble figuring out what the life of an asset is. That is true. And the accountants, legislators, and tax collectors in the U.S. have therefore come up with an even simpler approach for accelerated depreciation of assets. The U.S. Internal Revenue Service allows companies to use what is called the “Modified Accelerated Cost Recovery System (MACRS),” which was introduced in 1986. This system divides assets into six categories, defines an asset life for each category, and assumes the salvage value is zero. Another simplifying assumption is that the first and last years of an assets life are assumed to be exactly six months, so it is not necessary to track the actual date that assets were put into service. Since there are only a limited number of options, standard lengths for the first and last years, no salvage value, and no need to determine lives, book-keeping is simplified and there is no need to justify the choice of an asset life. As noted above, the term “accelerated” means that the lives in the MACRS are generally shorter than

what were previously used, so that companies can take more depreciation sooner. The option for using straight line depreciation is still available for some assets.

## Income Taxes

Individuals and companies pay income taxes that are calculated as a percentage of annual income. Income taxes may be progressive, which means that the amount of tax increases as a percentage of income for higher levels of income. The maximum tax rates vary from country to country, and a country may raise or lower tax rates from time to time. In the United States, additional income taxes are imposed by most of the states and some of the largest cities.

State and local taxes are deductible expenses when calculating federal income taxes, so that the effective income tax rate will be:

$$(Eq. 6) \quad \text{Effective Income Tax Rate} = SR + LR + FR(1 - SR - LR)$$

Where:

SR = state income tax rate

LR = local income tax rate

FR = federal income rate

Consider a company that pays federal taxes at a rate of 34% plus state taxes of 6% and a city tax of 1%. Their effective income tax rate will be:

$$(Eq. 7) \quad \text{Effective Income Tax Rate} = 6\% + 1\% + 34\%(1 - 0.06 - 0.01) = 39.55\%$$

Income taxes can have a large impact of cash flows, and it is necessary to consider how taxes relate to profits, return on investment, internal rate of return (IRR) or the minimum acceptable rate of return (MARR) for a company or an individual. Such financial objectives can be calculated before or after income taxes. The relationship between the before-tax and after-tax MARR and IRR can be approximated as follows:

$$(Eq. 8) \quad \text{After-tax MARR} = (1 - \text{Effective Income Tax Rate}) (\text{MARR})$$

$$(Eq. 9) \quad \text{After tax IRR} = (1 - \text{Effective Income Tax Rate}) (\text{IRR})$$

The higher one's tax rate, the more important tax effects become. Tax effects are extremely important for certain kinds of investment decisions. For example, in the United States, tax laws allow state and local governments to sell bonds whose interest is not subject to federal tax. Investors who live in the state that issues such bonds will not have to pay any state tax on the interest received from such bonds. Suppose a group of investors are considering municipal bonds instead of buying an AA-rated corporate bond that pays 6% interest. Would these investors be willing to buy a municipal bond offered by their local port authority that pays 4.0% interest? The investors agree that both bonds are very high quality, as they are rated double-A by bond-rating services. Some of the investors are in the 35% tax bracket, while others are in the 15% tax bracket; all of them pay 6% for state income taxes.

First consider the high income investors. Their effective income tax rate is calculated as follows:

$$(Eq. 10) \quad \text{Effective tax rate} = 6\% + 35\%(1 - 0.06) = 38.9\%$$

For these investors, the 6% interest received from the corporate bond will be taxed at the effective rate of 38.9%, so that they will only receive  $6\% \times (1 - 0.389) = 3.67\%$  interest after deducting federal and state taxes. They therefore would prefer the tax-free interest of 4% that they could obtain from buying the local bonds offered by the port authority.

For the lower income investors, the corporate bonds provide a better option, as these investors have a much lower effective tax rate:

$$\text{(Eq. 11)} \quad \text{Effective tax rate} = 6\% + 15\% (1 - 0.06) = 20.1\%$$

Their after-tax yield on the corporate bonds would therefore be  $6\% (1 - 0.201) = 4.79\%$ , which is well above the tax-free yield on the port authority's bond.

This example illustrates how the tax code can encourage certain investors to buy bonds to finance what legislators believe to be desirable projects. If the interest on municipal bonds were not deductible, then municipalities and states would have to offer much higher interest rates to attract investors.

Another way to promote projects is to allow companies and individuals to reduce their income taxes by an amount equal to a specified percentage of qualified investments. Governments may offer **tax credits** in order to promote investment in certain kinds of activities, such as education, housing for the elderly, rail transportation, or alternative energy programs. Legislation defines the type of expenditures that would qualify for the program and the amount of the tax credit. Infrastructure programs can be promoted via an **investment tax credit (ITC)** that could be used to reduce taxes during the year of the investment. Since infrastructure will be depreciated over a life of many years, the investment tax credit can be a major boon to developers during the first year of their projects.

For example, suppose the federal government has decided to provide a 20% investment tax credit to promote investment in housing for low income families. If a developer were to construct such housing at a cost of \$4 million, then the tax credit would be \$800,000. If the investment occurred in year 1, and if the company adjusted its estimated tax payments to reflect the tax credit, then the benefit would also be received during year 1, reducing the cost of the project from \$4 million to approximately \$3.2 million. Of course, the tax credit is a benefit only if the company actually pays taxes that are at least as great as the credit. If the company only paid \$200,000 per year in federal taxes, then the tax credit would have to be taken over a period of 4 years. In this case, the tax credit would be very much like an annuity of \$200,000 per year for four years, and it would be worth considerably less than \$800,000. Thus, the tax credit will be most valuable to profitable companies that will immediately be able to use the credit to reduce their current taxes.

This example and the prior examples have illustrated how accounting rules and the tax code define what expenses can be deducted from revenue in order to calculate income and what portion of income must be paid as income tax. In particular, we have seen that rules related to depreciation can have a major impact on what will be considered to be profit and what companies have to pay in taxes. Since depreciation is such an important policy tool, it is worth considering in some detail how depreciation and tax policy work together to affect projects. There are four things to consider:

- Depreciation converts investments into recurring expenses. The investment involves actual cash expenditures (possibly using borrowed money) that are not deductible for income tax purposes, while depreciation is a non-cash expense that is deductible.
- Accelerated depreciation allows a business to increase depreciation during the early years of an asset's life. This accounting change has the effect of reducing profits, but increasing cash flow.
- Depreciation can be treated as an expense even if it is clear that the asset is actually increasing in value, as is often the case with buildings.
- If an asset is sold, the new owner can depreciate the asset again, using the purchase price as the initial book value and using a life and salvage value allowed by accounting rules and tax regulations.

Table 2 shows the tax advantages of the three options for depreciating the asset that was included in Table 1 above. It is assumed that the business's effective tax rate is 40% and that the business indeed has taxable income remaining whichever method is used. For straight line depreciation, the annual tax benefits equal \$120,000, which is 40% of the annual depreciation of \$300,000. Over ten years, the tax benefit is \$1.2 million, and the net present value of the tax benefit, discounted at 10%, is \$0.737 million. With the double declining balance method, the annual tax benefits are initially much higher, but decline over the ten-year life of the asset. The total tax benefit is greater, with a NPV of \$1.023 million. The third method provides even more tax benefits, as this method fully depreciates the asset (i.e. no salvage value) and the NPV of the tax benefit is \$1.096 million. The accelerated methods of computing depreciation thus could increase the value of this asset by \$0.36 million – which is 9% of the initial construction cost. This is a good reason for developers to be extremely interested in the nuances of the tax code!

**Table 2 Tax Benefits of Depreciating an Asset With Initial Book Value of \$4 Million and a Life of Ten Years (\$ millions)**

Year	Straight Line		Double Declining Balance		Double Declining Balance Reverting to Straight Line	
	Depreciation	Tax Benefit	Depreciation	Tax Benefit	Depreciation	Tax Benefit
1	\$0.3 million	\$0.120	\$0.800	\$0.320	\$0.800	\$0.320
2	\$0.3 million	\$0.120	\$0.640	\$0.256	\$0.640	\$0.256
3	\$0.3 million	\$0.120	\$0.512	\$0.205	\$0.512	\$0.205
4	\$0.3 million	\$0.120	\$0.410	\$0.164	\$0.410	\$0.164
5	\$0.3 million	\$0.120	\$0.328	\$0.131	\$0.328	\$0.131
6	\$0.3 million	\$0.120	\$0.262	\$0.105	\$0.2621	\$0.105
7	\$0.3 million	\$0.120	\$0.210	\$0.084	\$0.2621	\$0.105
8	\$0.3 million	\$0.120	\$0.168	\$0.067	\$0.2621	\$0.105
9	\$0.3 million	\$0.120	\$0.134	\$0.054	\$0.2621	\$0.105
10	\$0.3 million	\$0.120	\$0.107	\$0.043	\$0.2621	\$0.105
Total		\$1.200	\$0.086	\$1.428		\$1.600
NPV		\$0.737		\$1.023		\$1.096

Now think about what would happen if the owner didn't have any taxable income. In that case, there would be no tax benefit from the depreciation, however it was calculated. The owner in such a situation might consider selling the asset to someone who could use those tax benefits – and who would allow the seller to lease the building on a long-term lease. Or, what is almost the same thing, the business would simply lease assets from companies that could get tax benefits from ownership and pass them on to the business in the form of low lease rates.

Let's return to the situation where the owner does have plenty of taxable income and can therefore take advantage of the tax benefits. In year 11, a change may be needed, as there will be no further tax benefits from the fully depreciated asset. The owner's taxes will therefore increase by \$120,000 per year. This conceivably would be a good time to sell the asset (if it still has useful remaining life), so that someone else could capture tax benefits from a new process of depreciation.

Depreciation is especially important in real estate, as buildings are very long-lived assets that can increase in value if they are well-maintained or in a good location. If the building's cost can be covered by a mortgage, and if rents are sufficient to cover the mortgage payments and upkeep, then the tax advantages of depreciation could be very important to the financial structure of the project. For example, consider a skyscraper that is constructed at a cost of \$450 million that has a salvage value of \$50 million. If this building is depreciated using straight line depreciation over 40 years, then the depreciation would be \$10 million per year and the tax advantage would be \$4 million per year for a business with an effective tax rate of 40%. For someone with a discount rate of 10%, this tax benefit would be worth approximately  $\$4 \text{ million} / 0.10 = \$40 \text{ million}$ .



If a capital asset is sold, then the difference between the sale price and the depreciated basis for the asset will be treated by accountants and the tax collectors as a **capital gain or loss**.

(Eq. 12)             $\text{Capital Gain} = \text{Sale Price} - \text{Book Value}$

The accounting logic (or perhaps we should say the “accounting fiction”) is that the value of the asset actually equals the depreciated basis that is reported to the tax collector and to shareholders up until the moment that the asset is sold. At the time of the sale, there is an instantaneous gain or loss in the value of the asset. Some assets, like automobiles, lose much of their value as soon as they are first put into service, so their depreciated basis will at first overstate the value of the asset. Other assets, notably real estate, not only depreciate less rapidly than assumed by the accounting rules, they are very likely to increase in value. Capital gains are typically taxed at a lower rate than income, so there is an advantage to companies and to individuals to receive cash payments as capital gains rather than as income.

Depreciation therefore is an accounting technique that protects some cash receipts from being taxed as income, while allowing taxes on any increases in value to be deferred until the asset is sold – and then taxing the capital gain at a lower rate! For owners of real estate, who expect their properties to increase in value, the tax rules related to depreciation and capital gains can be extremely favorable! From the public’s perspective, the favorable treatment of real estate may also be quite acceptable, either as a way to reduce the costs of providing rental housing or as a way to help attract investments in retail outlets, office buildings, and other businesses that provide jobs and increase regional income.

Depreciation, while important, is something that is typically governed by accounting standards and federal tax regulation, both of which are slow to change and neither of which is susceptible to manipulation by local governments. Local governments therefore will be much more interested in the tax incentives that they control, namely local sales taxes, local income taxes, and real estate taxes.

Local taxes can be used in two ways:

- Specific taxes can be targeted to specific projects, e.g. sales taxes are sometimes used to finance transit projects.
- Real estate taxes can be reduced in order to make certain kinds of development more attractive, e.g. a city might encourage a manufacturer to locate a new plant by offering a reduced real estate tax rate for a period of years.

As was the case with depreciation and capital gains, the key consideration will be the effect of changes in tax laws on the cash flows associated with potential projects. If taxes are increased in order to finance public projects, then the public authorities must satisfy voters that the benefits of the proposed projects will be worth the increase in taxes. Specific proposals will often be presented to voters in a referendum, and voters may decide whether or not to spend extra money to build schools, improve roads, construct bridges, or create a new sewerage system.

Tax deals designed to attract businesses or to encourage specific projects may or may not receive the same scrutiny, as it usually proves easier politically to provide tax breaks that promote a project than it is to raise taxes on voters in order to finance a project. Nevertheless, it is well worth considering whether the alleged economic benefits justify the tax concessions that are used to attract development. Large national and international corporations will be able to encourage competition among regions and even countries, and they may eventually locate where local governments are willing to forego almost all taxation. It is possible – but not desirable - for local governments to forego tax revenues even though they commit to considerable spending for local infrastructure and services related to the new project (e.g. new roads, increased road maintenance, increased police protection, and general increases in education and other public services related to population growth).

## Land Use Regulations

Local governments can also affect development through zoning and other regulations related to land use. If there are no limitations on land use, then developers may attempt to construct whatever provides them the greatest financial benefits. In some locations, this could be high-rise office buildings, while in other locations it might be new factories, a fast-food restaurant, or a recycling facility. Some cities make little or no attempt to limit development, allowing developers and land owners to do whatever they like with their land. In other locations, cities have elaborate plans that are used to guide development, and different parts of the city are zoned for different types of development.

Rationales for zoning include the separation of incompatible land uses, protection of scenic or environmentally sensitive areas, preserving land for special uses, and limiting the density of development to preserve the aesthetic or social character of the community. Opponents of zoning may have little faith in the ability of planners to direct development, they may believe that land owners should be able to do whatever they want with their land, or they may fear that greed, politics, and corruption will overrule fairness and common sense in planning. It is beyond the scope of this essay to delve into the pros and cons for planning and zoning, but it is central to our text to understand how zoning and other land use regulations affect the value of land and the potential for projects.

Since zoning can restrict the types of development that are allowed, it may prevent developers from building projects that they believe would be the most profitable. If so, then landowners or developers may seek a zoning variance that would allow them to undertake a different kind of project or a larger project. To secure a variance, whoever owns a plot of land may apply to the zoning board or whatever authority controls the land use regulations. If the land is re-zoned, then the more profitable project will be feasible, so the value of the land increases – perhaps very considerably. If land formerly zoned for single-family houses on 1 acre lots is re-zoned to allow apartment buildings, then land values could double or triple. If the land is re-zoned to allow construction of a large mall, then a few acres of land could suddenly rise in value from less than \$100,000 per acre to \$10 million or more!

When public planning commissions must vote on whether or not to re-zone land for more lucrative developments, there are obvious opportunities for political maneuvering, shady financial deals, double-dealing, and worse. Consider the scandal associated with a proposal to create a colossal sports and gambling complex in the site of a defunct racecourse situated within a large public park near Dublin, Ireland. The gambling scheme failed, despite much political maneuvering, transfers of envelopes of cash, lavish “corporate hospitality” at football matches, and offers of lucrative consulting contracts to political opponents. The scheme failed because of well-organized opposition that gathered 20,000 signatures from local residents against the introduction of gambling into one of the wealthier suburbs of Dublin. The promoters of the scheme had no option but to sell the old racecourse to another group, developers Flynn and O’Flaherty, who followed local government’s incentives that promoted construction of high-density housing in locations served by Dublin’s public transit system:

*Flynn and O’Flaherty set about having the racecourse rezoned for residential development ... [and] secured full planning permission ... to roll out more than 2,300 new homes, along with an 18-acre public park and other community facilities including bars, restaurants, shops, crèches and a primary school. In May 2004, when the first phase was launched, Flynn and O’Flaherty grossed 110 million pounds in one day and stood to make vastly more money from the Phoenix Park Racecourse than the bookies ever did in 90 years of racing,’ as Jack Fagan put it in the times.”<sup>2</sup>*

Among the promoters of the original gambling scheme was Mr. Bertie Ahern, the Taoiseach of Ireland (Taoiseach is the title for the prime minister of Ireland). After much public haggling over his involvement, which apparently included more than \$1 million in dubious transfers to and from his bank accounts, Mr. Ahern announced his resignation on April 2, 2008, while still denying that he had received a corrupt payment.

---

<sup>2</sup> Frank McDonald and Kathy Sheridan, **The Builders**, Penguin Press, Dublin 2008pp. 54-58

Zoning restrictions may also limit the size or height of buildings or the location of buildings on a site. Washington DC and Paris are among the cities that do not allow skyscrapers to be built in the center of the city in order to preserve the architectural integrity and prominence of their historic structures. New York City, after allowing hundreds of skyscrapers to be built in the lower portions of Manhattan Island, found that these immense structures could transform streets into dark canyons. In order to prevent further crowding of the airspace, the city instituted zoning laws in 1916 that allowed buildings to be constructed right out to the sidewalks, but required **setbacks** as the buildings rose higher:

*“On 25 percent of the plot, buildings could rise as high as technology and the will of the developer were willing and able to take them. The law divided the city into zones that allowed buildings to rise a different multiple of the width of the street before requiring a setback. In areas zoned for the most intensive use, ... buildings could rise straight up from the building line two and a half times the width of the street before setbacks were required. ... In some specialty zoned retail districts buildings could rise only one and a quarter times the street width, but in most of Manhattan buildings could rise one and a half times the width of the street.”<sup>3</sup>*

The result was that the city could benefit from the density of skyscrapers without having huge buildings block all of the light and air from reaching the street levels. Also, by allowing towers of any size on a quarter of the lot, this zoning allowed very tall buildings. The setbacks required by this zoning law were reflected in the design of the Empire State Building, the first 100-story building in the world.



**Figure 4 Typical Sidewalk View in Downtown Vancouver, British Columbia:** despite the prevalence of high-rise buildings, downtown Vancouver enthralls visitors with numerous tiny parks, sculptures, and waterfalls, which makes walking to and along the waterfront a delightful way to pass a couple of hours.

Another approach to zoning is to limit the **floor area ratio (FAR)**, which is the ratio of the sum of the total floor area of a building to the size of the site. A floor area ratio of 14, for example, would allow a 14-story building that covered the entire lot or a 28-story building that covered half of the site. The same FAR would allow a mixture of buildings on a site. For example, with the same FAR of 14, it would be possible to build a 40-story building on a quarter of the lot, a 6 story building on two thirds of the site, while leaving the remaining portion of the site as open space:  $40 (1/4) + 6 (2/3) = 14$ .

---

<sup>3</sup> John Tauranac, **The Empire State Building: The Making of a Landmark**, St. Martin's Griffin, New York, pp. 56-57

In suburban and rural locations, zoning is frequently used to limit the density of development by specifying a **minimum lot size** and limiting development to single-family residences for large portions of the region. The minimum lot size in a suburban location may be a quarter of an acre or less, while the minimum lot size in a rural location is sometimes set as high as five acres. These restrictions are certainly effective in limiting the total number of housing units, but they may also lead to sprawl, i.e. to the conversion of large portions of farmland and open space to residential uses.

A different approach to limiting density is known as **cluster zoning**, in which the density of development is still stated as the number of units per area, but the housing units (or other structures) can be clustered in a small portion of the site, leaving large portions of the site as open space. Cluster zoning can be very effective in minimizing the environmental impact of development, not only because it leaves much of the site as open space, but because it allows utilities and transportation services to be more efficient, as people and houses will be closer together.

### **Building codes and Other Safety Standards**

Governments establish building codes in order to reduce the risks associated with structural failures, accidents, fire, floods, earthquakes, and other natural or man-made hazards. Minimum standards for construction are needed to protect people from unsafe or unsanitary conditions in their buildings. As building technologies change – and as accidents or natural disasters identify problems – building codes may be updated.

Examples of regulations that are designed to reduce the risks of natural hazards would include the following:

- Design standards and inspection requirements for dams.
- Requiring brick firewalls between attached structures in order to limit the possible spread of fire.
- Requiring sprinkler systems and fire escapes for schools, apartment buildings, and office buildings.
- Higher standards for structures constructed in earthquake zones.
- Prohibitions regarding the use of lead pipes, asbestos insulation, and other materials that are known to cause health problems.

Regulations designed to improve safety would include:

- The use of nets and other precautions when constructing bridges and high rise buildings.
- Requiring railings for steps on residential housing.
- Requiring numerous safeguards for nuclear power plants.

### **Environmental Regulations and Restrictions**

Environmental regulations may affect what, how, where and when something is built. Examples include:

- Minimum setbacks from rivers, ponds, lakes, and wetlands
- Restrictions on filling wetlands
- Restrictions on development in flood plains
- Designation of areas as wilderness

Minimum setbacks from water are desirable for several reasons. Maintaining a natural buffer will help to limit water pollution resulting from runoff of rain water and allow a passage way for wildlife (Figure 5). In cities, pedestrian access to waterways and bodies of water is an important consideration, and many cities have developed linear parks along rivers, lakes or the ocean.



**Figure 5** The landscaping for this mall in Front Royal, Virginia features planting of trees and shrubs along the roads and parking lots and preservation of wetlands between the mall and the main access road from Interstate 66. Section 175-53.1 of the zoning code provides guidelines for development of “Highway Corridors” along the major entrances into the town and “strives to ensure that such development is compatible in use, appearance, and functional operations with the Town’s economic development policies and action strategies.”

Restrictions on filling wetlands recognize the importance of wetlands for many species of animals and plants as well as the ability of wetlands to act as a natural buffer for holding water following heavy rains or snow melt. When building roads or other transportation routes, it will at times be necessary to cross wetlands, but there may be routes that could be chosen that would limit the area of wetlands that would be filled in and there may be construction techniques (e.g. use of bridges rather than a causeway) that limit the disruption to the wetland. It may also be possible to create new wetlands alongside the highways, so that the net impact of the highway construction could be mitigated in some locations.

Some states have created a system that requires highway construction and other development projects to cover the costs of preserving and protecting wetlands. When new roads are constructed, the state department of transportation is required to a) limit the destruction of wetlands, if possible, b) to create new wetlands, if feasible, and c) to make a payment into a special fund for any wetlands that are destroyed. A separate agency uses the money from this special fund to a) acquire and preserve wetlands elsewhere in the state and b) to create new wetlands in locations where that is desirable. This process can be structured so that the area of wetlands that is preserved is much greater than the amount that is destroyed.

Individual landowners can also take action to limit future development by putting conservation easements on their property in order to limit future development. Easements may prohibit any development, or they may allow limited development such as the construction of a single house on a specified portion of the site. They may allow activities such as agriculture, forestry, sports (e.g. hiking or skiing), or they may require the land to remain in or revert to a wild state. An easement is a legal document. When an owner puts a restrictive easement on property, the value of that property will decline. The decline in value can, in some instances, be considered to be a charitable donation, as some legislation encourages landowners to provide easements aimed at preserving open space or protecting wildlife. The charitable donation is an amount that can be deducted from income when calculating how much is owed in income tax, so there can be a financial benefit to an individual or a company for placing an easement on a property. The amount of the deduction must be verified by qualified assessors who determine the value of the property with and without the easement, based upon recent sales of similar properties.

## Summary

Income tax is based upon net income, the difference between income and expense. Income taxes may be levied by local, state, or federal governments. Local and state taxes may be deductible from income when calculating federal income tax. The effective tax rate combines the effects of local, state, and federal taxes. The after-tax MARR equals the pre-tax MARR multiplied by one minus the effective tax rate. Since companies and investors are concerned with after-tax cash flows, their decisions concerning where to invest, when to invest, and how much to invest may be affected by tax policy. For example, governments may allow tax credits to promote certain types of infrastructure investments.

Since capital investment is not an expense, investment does not affect profit or income tax. However, capital assets decline in value over their lifetime, and the depreciation in the value of capital assets can be treated as an expense. Depreciation is a non-cash expense that represents the actual or assumed decline in value of assets other than land, which cannot be depreciated).

Depreciation, although it is a non-cash expense, will be deductible from income. Since depreciation can reduce income tax payments, the rules governing depreciation will affect the perceived value of a project to investors. Tax laws and accounting rules determine the methods that can be used to depreciate an asset. One commonly-used method is straight line depreciation, which assumes that a capital asset declines in value at a uniform rate over its life. Other commonly-used methods include double-declining balance and asset class depreciation, both of which allow higher rates of depreciation during the early years of an asset's life. Accelerated depreciation results in lower profits, which may seem undesirable, but it also results in lower taxes and an increase in the net present value of a project. Public policy may therefore allow accelerated depreciation as a means of encouraging certain types of investments.

Zoning limits the type of development that can be undertaken in a city or town. Certain areas may be zoned for residential, while others are zoned for commercial or industrial. Zoning may require a minimum lot size, designate how close a building can be to property boundaries, or limit the maximum extent of development, e.g. by specifying a maximum floor area ratio (FAR). Since the value of land is largely dependent upon the potential for development and the character of the surrounding areas, zoning may either enhance or depress land values. For example prohibiting obnoxious development within a residential neighborhood may increase the value of the homes in that area, but prohibiting more intensive development (e.g. apartment buildings or smaller lot sizes) may depress nearby land values.

Developers often seek zoning variances in order to initiate more intensive or what they believe to be better (and certainly more profitable) uses of the land. Where re-zoning would cause a dramatic increase in value – but equally dramatic changes in a neighborhood – there is potential for great local political conflict and controversy.

Land owners may choose to accept restrictions on their own property by creating an easement. For example, an easement could allow a right-of-way (e.g. for power lines or for access to other properties), allow public access, or allow or prohibit certain uses of the land. Conservation easements are commonly used to promote preservation of open space. Such easements may prohibit further development or allow only agricultural or forestry activities. If landowners donate an easement on their property to a qualified charitable organization, then they can treat the assessed reduction in the property's value as a tax deduction.

Building codes define what materials and methods can be used in construction, and they may mandate better construction techniques and materials in areas prone to natural hazards, especially earthquakes or flooding. Safety standards may be part of building codes. For specialized facilities, such as nuclear power plants, safety standards may require great care (and great expense) in design, construction, and operation. As technology advances, the logic underlying building codes and safety codes may need to be revised to allow cheaper or more effective methods and designs (e.g. plastic pipes for plumbing). As knowledge of environmental impacts and risks increases, building codes may need to be revised to avoid dangers that were previously unknown (e.g. the use of asbestos for insulation is banned because this material is linked to lung cancer).

Environmental regulations may affect what, how, where and when something is built. Examples include:

- Minimum setbacks from rivers, ponds, lakes, and wetlands
- Restrictions on filling wetlands
- Restrictions on development in flood plains
- Designation of areas as wilderness

Legislation or regulation may require infrastructure projects to mitigate their effects on the environment. For example, transportation projects that disrupt wetlands may be required to pay money into a special fund that is used to protect or to create other wetlands.

### **Figure 6 Pier A Redevelopment Project, Battery Park, Manhattan**

The City of New York and the Battery Park City Authority are working with the NY City Economic Development Corporation to rehabilitate this historic Pier, which was constructed in the 1880s. The goals are enhance access to the waterfront, create jobs, and produce economic benefits for the city.



MIT OpenCourseWare  
<https://ocw.mit.edu>

Resource: Project Evaluation: Essays and Case Studies  
Carl D. Martland

For information about citing these materials or our Terms of Use, visit: <https://ocw.mit.edu/terms>.