APPRAISING OIL & GAS PROPERTIES

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The Cost-of-Capital Discount Rate: Sources and Derivation

Oil and gas properties are most commonly appraised using the Income Approach. This method requires construction of a cash flow and the use of a discount rate to estimate value. In our ongoing quest to bring enlightenment and a little lightheartedness to the discussion of oil and gas appraisal practice, we thought we might skip over the easy part (the cash flow) and go directly to discount rates. This is, after all, the real "fun stuff' and also an area that causes more argument than any other in the appraisal process. We have included references to numerous texts and articles, many of which are actually pretty good reading; think of this discussion as the Cliff Notes™ version. The Income Approach to value generally recognizes two sources of a discount rate:

- Derivation from Market Sales
- Derivation from the Cost-of-Capital

The Market Sales derivation requires that there be sufficient data about market transactions to be able to equate the actual purchase price to the future income expectations of the buyer. In practice, this means comparing the purchase price to the buyer's cash flow. This effective discount rate would reflect all the factors considered by the buyer in the cash flow and would be a fair market value discount rate if the purchase price met all the requisite conditions. Because information of this kind is rarely available to the appraiser, other sources must be relied upon for discount rates.

Cost-of-Capital Discount Rate

The Cost-of-Capital discount rate is often used as a substitute for a market derived discount rate and may be the only discount rate available for mass appraisal purposes. It is, therefore, fair to ask, "What is the Cost-of-Capital?" The second question is usually "Why do I care?", but we will deal with that later. The term "cost" is somewhat confusing since it implies out-of-pocket expenses for obtaining capital. That is not the case. The Cost-of-Capital ("COC") is actually the rate-of-return or yield that the supplier of capital expects as compensation for his investment. In industry usage, the COC is the weighted average of the costs of the debt and equity portions of the funds used for investment. This approach is also known as the weighted average cost-of-capital ("WACC"). In appraisal usage, WACC applies to funds that would be used by prospective purchasers of (petroleum) properties. It must be a prospective rate; therefore, it is the combination of the respective returns anticipated by the holders of the debt and equity portions of the invested funds[1] In a small company, the debt holder might be the bank or other lender while the equity holder(s) might be the individual investors or partners. In a large corporation, the debt return would be the yield expected by the public and institutional holders of the corporation's bonds and notes issued by the corporation while the equity return would be the growth and income return anticipated by stockholders. In either case, it is the expected future return on debt and equity, not the historical return, that is at issue.

Ibbotson[2] probably summarizes Cost-of-Capital best:

"The cost of capital has three conceptual meanings. On the asset side of a firm's balance sheet, it is the discount rate which should be used to reduce future values (dividends or cash flows, for example) to a present value. On the liability side, it is the economic cost to the firm of attracting and retaining capital in a competitive environment where investors (capital providers) carefully analyze and compare all return-generating opportunities. To the investor, the debt or equity cost of capital is the expected return on his or her investment."

The COC is not (a) the cost of borrowed funds alone, (b) the cost of equity funds alone, or (c) a function of prime rate. Furthermore, it should be a return (cost) consistent with the term of the intended investment. Most oil industry investments, such as acquisitions of producing properties, are relatively long-term requiring several years to pay out the initial investment and often much longer to reap the full benefit of the investment. The appropriate return is not prime rate or commercial paper rates but 10-20 year bonds and equity held for the duration.

Use in Capital Budgeting

The WACC is not simply an abstract number used to substitute for a market discount rate. It serves a very real purpose in industry as part of the capital budgeting process. A company rarely has sufficient funds to invest in all the projects and opportunities that are presented at any one time, whether it be exploratory drilling, property acquisitions, refinery construction, or field improvements. The available funds must be allocated in a rational manner to those projects with the best potential return.

There are numerous methods used to allocate investment capital, including some that are not too scientific; for the most part, two methods and their variations dominate. These are "Net Present Value" (NPV) and "Internal Rate-of-Return" (IRR). Both are based, at least in part, on the WACC. For simplicity, assume that there are 10 good projects competing for funds that are sufficient for only some of the projects. Using the NPV method, the expected cash flows from each project would be discounted at the company's current COC. The projects are ranked in order of decreasing NPV of future cash flow and are selected in order until all available funds are used up. Using the IRR method, the anticipated cash flow from each project is used to determine the IRR that could be expected on the initial investment. This is done for each project. Projects with a IRR greater than COC are accepted up to the limit of available funds; any project that has an anticipated return less than the COC is not funded.

Before going any further - there will be letters and calls telling me that this is wrong or "not the way we do it". Well, what's a good day without stirring something up? There is, of course, more to this than can be printed in a newsletter; there are several very good references listed at the end of this article. Also, each user applies his own interpretation and nuance to the process. However, the basic approach is as presented above. There are always exceptions ("'TAAE"). We look forward to your letters.

In both methods, the WACC is used as a basic determiner for allocation of funds. When used in the IRR approach, the WACC (or a variation defined by the company) is often known as a Minimum Required Return ("MRR") or "hurdle rate." The treatment by each company of this minimum return may be different, but not significantly so, because they must compete with each other.

Of course, in practice the process is not so cut and dried. Some lower ranked projects may be accepted over others because they are deemed to be necessary today while other projects can be deferred. Likewise, a project with a return lower than the WACC might be accepted because it serves some other corporate goal that is, perhaps, not readily quantifiable for allocation purposes; such as acquisition of reserves to assure long-term refinery feedstock. The overall benefit from upstream and downstream may generate a return greater than WACC.

In 1993, Dougherty and Sarkar[3] found that the vast majority of companies surveyed use IRR and NPV as primary budget allocation methods and the WACC is the primary defined basis for discount rate selection.

Cost-of-Capital in Generally Accepted Appraisal Practice

"The Appraisal of Real Estate" refers to the cost-of-capital in several contexts. The text uses the term Band-of-Investment to describe the composite of debt and equity but also refers to the cost-of-capital. Because of the emphasis of the text on (surface) real estate appraisal, the discussion refers to mortgage debt and debt/equity ratios of 70-80%. As will be shown below, this is not entirely compatible with the financing of oil and gas projects, however, it is a difference of form not function. Also, the determination of equity return is very focused on individual transactions not the general market. Even so, there is a clear recognition in appraisal practice of the role of the cost-of-capital in the capital investment process.

Cost-of-Capital in Properly Tax Regulation

The COC is often accepted as a source of a discount rate in those jurisdictions where regulations and or established usage define methods and procedures. In California, State Board of Equalization Rule 8[4] (The Income Approach) defines two acceptable sources for a discount rate; the Market Derived method and the Cost-of-Capital method. While the market derived approach is preferred, the COC method is fully acceptable if derived and used correctly. As stated in paragraph (g)(2), a discount rate can be obtained:

"By deriving a weighted average of the capitalization rates for debt and for equity capital appropriate to California money markets (the band-of-investment method) and adding increments for expenses that are excluded from outgo because they are based on the value that is being sought or the income that is being capitalized. The appraiser shall weight the rates for debt and equity capital by the respective amounts of such capital he deems likely to be employed by prospective purchasers."

There are, of course, no "California" money markets -all money markets are interrelated. Aside from this point, the method described is the weighted average cost-of-capital. A key point in Rule 8(g)(2) is the reference to "respective amounts . . . likely to be employed by prospective purchasers." Some evaluators have been known to ignore this requirement and to assume that the capital would include a high proportion of debt, much like a home mortgage, irrespective of data to the contrary. There is no requirement in Rule 8, or in general appraisal practice, to assume that any property acquisition must have a certain proportion of debt to equity, let alone take on the financing character of a residential mortgage. More about this later.

The State of Utah, which has gone to an income approach methodology for ad valorem tax, now calculates and recommends a WACC discount rate for use in appraisals. The Property Tax Division of the Comptroller's office in Texas (formerly the State Property Tax Board) has calculated and published a WACC discount rate for many years. The Discount Rate Manual, soon to be issued in Texas, as mandated by the Craddick bill, is based in large part on WACC analysis.

Construction of the Cost-of-Capital

The determination of a WACC is a relatively simple exercise that, nonetheless, benefits from a working knowledge of the source and evaluation of the components and some experience in applying the required principles. The WACC has three major components:

Capital Structure - The proportion of debt and equity in the total corporate capital.

Cost of Debt - The rate-of-return, or yield, expected by the holders of the debt portion of total capital.

Cost of Equity - The rate-of-return expected by the equity (stock) holders.

Note that we have referred to total capital as the basis of the capital structure and of the respective costs of debt and equity, and implied a corporate source of data. This is in keeping with financial practice and regulations such as Rule 8. Actual sales data indicates that most oil industry acquisitions are for cash taken from corporate funds. Conclusions derived from public corporate sources would apply just as well to private companies, partnerships, and individuals. All must compete in the same markets for both funds and investment returns. Tax regulations may give one group an advantage, but this is usually transitory.

Capital Structure

Within the two major parts of the capital structure are several minor parts:

Capital Structure	
Debt	Equity
Public Debt (Bonds & Notes)	Common Stock
Institutional Debt (Notes)	Preferred Stock
Bank Debt	

Production Financing
Capitalized Leases

Financing data is required as part of the information reported to assessors in California. Analysis of several hundred transactions in California since 1983 indicates that over 98% of the transactions (as a function of purchase price) were acquisitions for cash with no financing involved. Structured transactions using specific debt and equity financing are the exception rather than the rule. Most of the exceptions were small transactions with short-term seller financing which often had a tax motivation.

"Cash to the seller" is generally funds taken by the buyer from corporate capital budgeted for acquisitions. In a strict sense, these funds could be thought of as coming from retained earnings which are 100% equity. However, since good financial management would attempt to assure that capital costs were kept to a minimum, it should be assumed that an appropriate mixture of debt and equity would be used to provide funds for corporate acquisition investments. This does not mean that every project is funded with a certain percentage of debt and equity but the "pool" of corporate funds used for investment would reflect an appropriate mix of debt and equity. (Again, every one is different and there are always exceptions - to everything.)

Historically, the oil industry has maintained a ratio of about 30-35% debt (all forms) and 65-70% equity. This ratio is evident from analysis of corporate balance sheets[5] and from studies of sources and uses of corporate capital.[6] The share of debt increased significantly during the merger era of the early 1980" but most companies have reduced debt since that time, as equity values have increased, so that historical ratios now prevail.

The debt and equity proportions are fairly easy to calculate:

Debt includes the outstanding amount of public and private debt plus capitalized leases at the date of the analysis. In the WACC analysis done by this firm, we include only long-term debt with over one year maturity.

Equity is the market value, not the book value, of all outstanding common stock shares as of the date of analysis. We include preferred stock as equity. Some consider preferred stock to be more like debt. The debate is academically interesting, but in the oil industry the amount of preferred stock is minuscule and has no measurable impact on the amount of either debt or equity.

These are practical aspects to the capital structure that must be considered. "In a world without . . . taxes, the weighted average cost of capital is a constant. With taxes, the WACC declines as the ratio of debt to equity increases."[7] Interest is deductible, dividends are not. Increasing debt has certain tax advantages. However, with increased debt, the equity value of the firm first increases, reaches a maximum, and then begins to decline. There is a point at which increasing debt causes debt and equity holders to become concerned about the ability of the company to repay debt, continue operations, etc. Interest payments come out of earnings; equity holders begin to require higher returns to compensate for risk which then causes the WACC to increase. Anyone who has bought a house is familiar with loan payment-to-income ratios.

In the absence of a specific financing, the mix of capital used for determining cost-of-capital must be the overall capital structure of prospective purchasers. It cannot be an arbitrarily assumed mortgage debt/equity ratio. Some appraisers have suggested using ratios of 70% debt and 30% equity because that is what the buyer could have borrowed to finance the project. The biggest flaw here, of course, is the assumption that what buyers could (maybe, possibly, should?) have done is relevant. The only relevance is what buyers actually did; not what they COULD have done.

The "could have" concept has a deeper flaw that is again familiar to anyone who has bought a house. While the lender may provide 80-90% or more of the purchase price, he looks to the borrowers total financial position as support for the loan along with the security of the house. The old rule, that the total loan payment should not exceed 25% of the borrowers' income, was designed to insure that there was sufficient solvency to assure repayment. In making oil loans many years ago, banks made production payment loans calculated on repayment from specific properties, but the loan was always predicated on the underlying financial strength of the borrower and made him the ultimate source of repayment. TAAE.

Finally, there are those who argue that the required return for an investment should be measured against the cost of the capital sources employed for that investment. This ". . . temptation should be resisted . . . Otherwise when new debt funds are available the manager might be misled into accepting low-yield projects that barely cover the . . . cost of debt.."[8] Once borrowed funds were exhausted ". . . the company would have to revert to equity capital, which is more expensive, and . . . reject some . . . investments that failed to return the . . . cost of equity."[9]

The capital structure that is appropriate for a COC discount rate is the proportion of debt and equity most likely to be used by prospective purchasers for property acquisitions. Since most significant transactions tend to be for cash, the capital structure should reflect the mix of debt and equity maintained as corporate funds used for investment.

Cost-of-Debt

Once the appropriate capital structure is determined, the next step is to determine the costs of the debt and equity components. The cost-of-debt (COD) is relatively easy to determine: it is not the prevailing prime rate, or prime rate plus X %, nor is it the corporate AAA bond yield or the interest rate on 30-year Treasury bonds.

As noted by Bierman and Smidt:[10]

"The cost of long-term debt capital is the current effective interest rate for long-term securities of the specific firm being studied."

also; according to Ibbotson:[11]

"How do you estimate the long-term cost of capital. For debt one uses the yield to maturity."

This is straight-forward. We are interested in long-term debt because the term of the debt is

comparable to the term of an investment in oil and gas properties. We use the yield-to-maturity ("YTM") because that is a forward rate that continuously measures the expectations of debt holders regarding the debt of specific companies.

In the WACC analysis for our annual WSPA study, we use a sample group of about 50 publically traded companies. A list of the outstanding debt issues is obtained from the annual report and/or SEC 10-K (sometimes supplemented with other data). The outstanding amounts for each debt issue are tabulated. The YTM for public issues (bonds, debentures) is obtained from the monthly Moody's Bond report. The effective interest rates on institutional debt is taken from the annual report or is calculated. The COD for that company is the weighted average of the yield and interest rates for the individual issues as a function of total debt.

Some would consider this to be historical debt and suggest that only debt to be issued should be used. While a projection of future debt would be very interesting and more "prospective" it is not likely to be very accurate. The issue is the proportion of debt to total capital and that can be determined from existing debt and trends. The dollar amount of debt is used to determine the proportion of debt to total capital and should be a representative of the mix of debt and equity that would be maintained by the company under normal circumstances. A change of a few percent in the debt portion has little effect on WACC. (TAAE)

The COD for each of the companies in the sample group is averaged to obtain an industry average cost of debt. There is no weighting; the debt of each company is already rated on its own merits by the market. There should not be, and usually is not, much variance among companies or sub-groups. In our 1993 study of year-end 1991 results, the 14 major companies had COD that differed by less than one percentage point from the average. The COD for 34 independent companies exceeded that of the majors by about 1% with a moderately wider variation among companies.

Cost-of-Equity

The third major element of the WACC is the cost-of-equity ("COE"). As might be expected, it is not easy to determine the return desired by equity holders. Even the definition is difficult. Weston[12] says:

" ....the cost of equity capital is defined as the rate of return that must be earned to prevent the price of the stock from falling ...."

also:

"The finance literature defines the cost of equity as the expected return on a company stock. The stock's expected return is the shareholder's opportunity cost of the equity funds employed by the company."[13]

and:

"In theory, the company must earn this cost on the equity-financed portion of its investments

or its stock price will fall. If the company does not expect to earn at least the cost of equity, it should return the funds to the shareholders who can earn this return on other securities at the same risk level in the financial marketplace."[14] (A good point to keep in mind).

COE is, therefore, an expectation rate set by investors. If the return on equity falls below expectations, investors will sell their shares; thereby depressing the price of the stock which reduces market value which results in diminished corporate net worth. In order to avoid this chain of events, companies attempt to invest funds in projects (acquisitions) that are expected to earn a return at least equal to the WACC. In practice, minimum required returns may be set above the WACC in order to compensate for those projects that fail to provide anticipated returns.

There are four basic methods described in financial texts for calculating COE. These are:

(a) The Earnings/Price Ratio
(b) The Capital Gains Valuation Method (also known as Realized Investor Yield)
(c) Dividend Growth Model
(d) The Capital Asset Pricing Model

The first three methods are perfectly sound approaches to cost-of-equity and have been used in our own cost-of-capital study. There are two basic problems in using these three methods in a specific study. First, many companies do not issue dividends and earnings relative to price may fluctuate so much that they are less than useful for projection of future earnings or price. Second, in order to be useful in estimating anticipated returns, projections of future earnings, prices, and dividends are necessary. Unless one is a full-time equity analyst, such projections are not usually possible. Third-party projections can often be obtained from tested and reliable sources but not for all companies. As an example, Value Line Investment Services makes quarterly projections of earnings, etc. for a large number of companies, but only about two-thirds of our sample group of companies is covered.

This lack of information and other reasons had led to greater emphasis on the Capital Asset Pricing Model (CAPM). This method was developed in the early 1960's and has been extensively used, researched, written about, and tested in the marketplace."[15]

As noted by Ibbotson:[16]

"The CAPM was originally formulated by Sharpe and Lintner to measure the short-term cost of capital, but it can be adapted so as to measure the long-term cost of capital."

CAPM is a general equation that can be adapted to specific uses by selection of appropriate base parameters. For the appraisal of long-term investments such as oil property acquisitions long-term parameters are used.

Cost of Equity (COE) $= R^f + (R^m - R^f)ß$

where: R^f = risk-free return
R^m = market return
ß = Beta factor, a measure of the volatility of a particular stock relative to the market as a whole.

In using CAPM to calculate long-term cost of equity, ". . . the most satisfactory way is to take the long-term government yield-to-maturity as the long-term riskless rate and the arithmetic mean excess of equity total returns over (the) long-term government bond yield as the long-term equity risk premium."[17] Beta (ß) is calculated and published by several sources including Valueline and Standard & Poor's. Long-term Treasury yields are published daily in the newspaper, and market returns are calculated and published by lbbotson, among others. This ready access to data makes it possible to determine COE for a large group of similar yet diverse companies. The method provides v e r y good information regarding investor's anticipated returns and can be compared to the COE derived by the other three methods when data is available.

Putting It Together

Once all three pieces are developed, the Capital Structure can be combined with the Costs of Debt and Equity to calculate a cost of capital as shown in the box above.

As derived above, the COD is before income tax (BFIT) while the COE is after income tax (AFIT). For most appraisal purposes, a BFIT discount rate is needed. The cost of equity can be adjusted to before-tax by dividing by (1 - Tax Rate). This is a simplified approach derived from the common textbook method. Financial purists will argue that more detailed adjustment should be done and they are right. Several methods could be used to back out income tax effects from corporate returns and create adjusted earnings projections, beta's, etc. However, the simpler approach seems adequate for the purpose at hand.

Cost of Capital = [(Cost of Equity) x (%Equity)] + [(Cost of Debt) x (%Debt)]

The BFIT cost-of-equity is used with the BFIT cost-of-debt to determine a BFIT WACC.

The preceding paragraphs contain several references to corporate stock, stock prices, and equity markets. These references should not obscure the point of the exercise. The WACC analysis discussed above is NOT for the purpose of valuing stock or determining the value of a company as a whole. The purpose is to define the returns on debt and equity that are necessary in order to attract investment capital.

The term "attract investment capital" may unfortunate because it implies outside capital - new debt and/or equity. However, the vast majority of equity capital available to a firm is retained earnings from ongoing operations. "Retained earnings represent capital invested in the firm just as much as funds obtained externally..."[18] It must be presumed that a company would invest retained

earnings in such a way as to earn the best possible return. For most companies that means re-investment of earnings in new projects. If a company had no projects that would earn at least the cost-of-capital, then presumably it would invest outside the firm (department stores, circuses, and hard mineral investments come to mind) or as noted above, return the funds to shareholders.

Minimum Required Return

Having said all of the above, it is important to remember two things about the discount rate derived from the WACC method.

1. The COC discount is not a direct derivative of fair market value conditions and should be used with caution where fair market value is the appraisal objective.

2. The COC discount must be adjusted for the risk associated with a specific investment.

Both these conditions are exemplified by the preference in appraisal practice and regulations, such as Rule 8, for the market derived discount rate ("DCR").

The first point is fairly obvious but should not be ignored. With proper calculation and some knowledge of the relation of market DCR to COC discount rate, an appraiser can come pretty close to a market value for ad valorem tax purposes. The experience of the WSPA studies has been that market derived discount rates consistently exceed cost of capital discount rates. (See July '93 newsletter.) The mean market discount rate runs 8-9% above the average cost-of-capital while the lower margin of one standard deviation tracks the mean WACC very closely. This result should be expected. Property acquisitions involve more risk than many other investments that could be made. There will be arguments with this but the evidence is pretty clear.

The second point is sure to start a lively discussion at your favorite watering hole and has been the subject, directly and indirectly, of parts of textbooks, learned articles, treatises, and not a few court transcripts. Is the COC discount rate (WACC) the minimum discount rate for valuing properties and projects using an Income approach or is the WACC simply a starting point for driving specific discount rates for certain projects with identified risks or is it merely a relative measure of expected return? I should just leave this issue here and invite some response but instead we will forge bravely ahead. Actually, I fudged a bit (I'm the writer - I get to do that) because the COC discount can be and is all three. The differences come in the practical application. TAAE.

Because of the way it is constructed, the WACC is the cost-of-capital to the company as a whole and represents the future expectations of debt and equity holders for returns on the company's operations. There is an implicit assumption that the company will continue to operate and finance projects in the same manner as before. The market "corrects" the value of the company's stock price and debt when expectations change or the company signals a change. The company cost-of-capital "... is the correct discount rate for projects that have the same risk as the company's existing business but not for those projects that are safer or riskier than the company's average.."[19]

Most investors only see overall returns and, unless some flashy project either takes off or bites the dust, have little opportunity to base expectations on an assessment of project risk. So the cost-of-capital is a minimum as far as the investor is concerned - if returns consistently fall below expectations he will move his investment elsewhere.

This brings into question the idea of accepting projects that have expected returns that are below COC because they are presumed to be lower risk. This sounds reasonable and has some appeal but there cannot be too much of this because eventually investors will begin to recognize the shift to lower risk/lower return and adjust accordingly. Projects with expected returns below COC are few and far between and are often only part of an overall plan that compensates for the low return with another higher return project; the earlier example of buying reserves as refinery feedstock is a case in point. Absent such a specific reason, a company would be better off buying it's own stock than in accepting lower return projects. Here again the WACC is a minimum discount rate.

As noted earlier, the COC is a major part of capital budgeting. As noted by Weston[20] in discussing the NPV method, "... To implement this approach, find the present value of the expected net cash flows of an investment, discounted at the cost-of-capital, and subtract from it the initial outlay cost of the project" (emphasis added) Here the WACC is the discount rate for all projects and fills the role of minimum discount rate.

But there is still that pesky risk issue to be handled. The opportunity cost-of-capital is the COC (return) that would be attracted to and required of projects with similar risk. This is a neat and simple idea - all projects of a certain risk category are evaluated at a discount rate that reflects that risk. In theory, a sliding scale of risk versus return (sound familiar) is developed; the appraiser determines the risk in the project, picks the commensurate return, and calculates the project value.

The opportunity cost-of-capital, in theory, can be used in both the NPV and IRR methods of capital budgeting. However, the real world occasionally rears it's uneducated head and causes problems. First, appraisers do not all assess risk and return the same way - neither do managers and financial people. Second, perceptions of risk change with time. Getting people within a company to agree of risk/return definitions is difficult - it would be impossible for an industry. Many companies have tried this approach and some still use it in one form or another.

The general practice, however, seems to be to include the perceptions of risk in (a) the cash flow and (b) the investment amount. In oil property acquisition this takes the form of either reducing the production projection or other part of the cash flow by a risk factor, or negotiating the purchase price to compensate for risk -or both. Risk adjusted cash flows are discounted at the same discount rate company wide. According to the Dougherty study, that would be WACC or a rate based on experience (read WACC+). Any remaining risk is mitigated by negotiating the purchase price until required return is achieved. The resulting IRR can then be compared to WACC to determine if the return suffices to compensate for risk.

So, the WACC is the minimum discount rate for risk inclusive cash flows and is the relative measure against which returns are compared. This is good to know - at least it sets a floor for

discount rates. But, there are many times when an appraiser cannot or should not include risk adjustment in the cash flow - such as, when doing mass appraisals for ad valorem tax. In that case the appraiser must use a COC discount rate adjusted for risk. This would be the opportunity cost-of-capital for oil property acquisitions.

The best source for this information is a comparison of (a) discount rates from actual market acquisitions to (b) the WACC for companies who are or are likely to be (prospective) purchasers of properties. The 1993 WSPA study found an average WACC of about 16% for oil companies (BFIT) and an average discount rate for acquisitions of Proved Producing resources of about 20% a risk premium of about 4%.[21]

A second source, where no sales data is available, could be the return-on-equity of producing companies. This latter may be of some help, particularly if the company is active in acquisitions of reserves, but it is only an interim step because the risks are those of production not the specific risks of investment in acquisition. It would be a higher minimum but still a minimum rate.

Endnotes and References

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21. See 5 above.

Happy Holidays