UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Composition of Proxy Companies	)	
For Determining Gas and Oil	)	Docket No. PL07-2-000
Pipeline Return on Equity	)	

ADDITIONAL INITIAL COMMENTS OF THE INTERSTATE NATURAL GAS ASSOCIATION OF AMERICA ON PROPOSED POLICY STATEMENT

In response to the Commission's "Notice of Technical Conference and Request for Additional Comments,"[1] issued on November 15, 2007, the Interstate Natural Gas Association of America ("INGAA") hereby submits the following additional comments.

BACKGROUND

In its July 19, 2007 Proposed Policy Statement, the Commission proposed to permit inclusion of Master Limited Partnerships ("MLPs") in the proxy group used to determine pipeline rates of return under a discounted cash flow ("DCF") analysis. However, the Commission also proposed to cap the distribution used in the DCF analysis of any MLP at the level of the pipeline's earnings. The cap was proposed to address a concern that allowing distributions in excess of earnings to be used in the DCF calculation would allow a pipeline to double recover depreciation expense by basing its return on equity, in part, on distributions that include a return of capital to unit holders. Proposed Policy Statement at PP 18-19.

In its comments, INGAA demonstrated that the Commission's concerns about a distribution including a return of capital or a depreciation component are misplaced, and that an earnings cap on MLP distributions would be inconsistent with the market-based

[1] *Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity*, 121 FERC ¶ 61,165 (2007).

theory underlying the DCF methodology. In particular, INGAA noted that the Commission itself recognized the inverse relationship between MLP distributions and short-term IBES growth rates, and that the market adjusts to take into account all variables in the DCF formula. *See* Proposed Policy Statement at P 21.

In the November 15 Notice (at P 5), the Commission stated that the existing record is not sufficient for it to determine (1) whether its current method of projecting growth adequately reflects the lower growth potential of MLPs, particularly over the long term, and (2) if not, what alternative method should be used to project the growth of MLPs.

COMMENTS

In its initial comments, INGAA noted that while MLPs generally pay out more in distributions than corporations, the IBES short-term growth rates of MLPs were correspondingly lower than corporations. In its latest Request for Additional Comments, the Commission has questioned whether this same inverse relationship exists with respect to long-term growth rates. Specifically, the Commission seeks comments on whether projections of long-term growth rates for MLPs in the DCF formula should be lower than Gross Domestic Product ("GDP"), which the Commission currently utilizes as the measure of long-term growth.

As a threshold matter, INGAA would note the absence of any empirical evidence that would suggest that MLPs are not able to achieve the same growth over the long term as corporations. INGAA would also note that GDP is itself an imprecise estimate of long-term growth. *See Northwest Pipeline Co.,* Opinion No. 396-B, 79 FERC ¶ 61,309 at 62,382 (1997); *Transcontinental Gas Pipe Line Corp.,* Opinion No. 414-A, 84 FERC ¶

61,084 at 61,423 (1998). The rationale for using GDP as the measure of long-term growth is an expectation that a regulated firm will ultimately grow at the rate of the average firm in the economy. *Northwest Pipeline Co.*, Opinion No. 396-C, 81 FERC ¶ 61,036 at 61,192 (1997).

Therefore, INGAA submits that it is reasonable to conclude that in the long-term MLPs will grow at the same rate as corporations, and that the use of GDP as the measure of long-term growth for both MLPs and corporations is appropriate. To the extent that a limited partner's ("LP") units could be expected, as a theoretical matter, to grow at a lower rate than corporate common shares (see discussion below), it would not necessarily follow that the long-term growth rate for LP units in the DCF model should be lower than GDP. Rather, it could just as easily be concluded that the use of GDP in the DCF model understates the long-term growth rates for corporate shares, and the correct way to adjust for the difference in growth rates between LP units and corporate shares, is to utilize GDP for LP units and increase the growth rate for corporate shares. Given the inability to determine whether GDP understates the growth rate of corporate shares, or overstates the growth rates of LP units in the DCF model, INGAA submits that a reasonable approach would be to continue to utilize GDP in the DCF model as the measure of long-term growth for both types of investor.

In the alternative, INGAA would propose a slight modification to the Commission's current DCF methodology which produces reasonable results in the current economic environment. As explained below, the proposal represents a pragmatic approach that assumes for the sake of argument that GDP is the correct measure of the long-term growth rate for corporate shares, and proposes a slight reduction in the measure

of LP units' long-term growth. As discussed in more detail below, this proposal is based on a purely theoretical analysis. As empirical evidence accumulates over time, the proposal may need to be revisited.

Attached is an analysis prepared by Michael J. Vilbert of the Brattle Group. Mr. Vilbert has a Ph.D. in Financial Economics from the Wharton School of the University of Pennsylvania and is an expert in, among other things, estimating cost of capital. Mr. Vilbert recognizes that predicting long-term growth for use in the DCF model is a matter of estimation and judgment, not precision. In addition, he notes that the choice of model involves a tradeoff between accuracy and simplicity. Because the Commission's current model examines an MLP's distribution yield and projected growth from the perspective of the limited partner, as opposed to the MLP as a whole, Mr. Vilbert proposes one modification to the existing methodology to address the Commission's concern about the long-term growth prospects of MLPs as compared to corporations. Specifically, Mr. Vilbert proposes a long-term growth rate for LPs equal to the average of GDP and the Federal Reserve Bank's target long-term Consumer Price Index rate of inflation. By proposing a long-term growth rate for LPs lower than GDP, Mr. Vilbert's proposal directly addresses the Commission's concern that limited partners' long-term growth rates can be expected to be lower than corporations.

To test the reasonableness of the results of his proposal, Mr. Vilbert also sets forth a Benchmark Model that attempts to reflect more accurately financial theory. This model focuses on the MLP as a whole, and therefore includes the impact of the general partner's Incentive Distribution Rights ("IDRs") in the DCF formula. In addition to incorporating the general partner's share of the MLP's equity, this model assumes a gradual step-down

from short-term growth rates to long-term growth rates, as opposed to the Commission's simpler methodology. Finally, because the long-term growth rates of MLPs, when viewed from the perspective of the MLP as a whole, can be expected to be similar to that of corporations, the Benchmark Model uses GDP as the measure of long-term growth for both types of entities.

As Mr. Vilbert explains, there should be no difference in the overall cost of capital based on organizational structure, assuming that both entities face a similar degree of risk. Thus, when viewed at the entity level, growth rates of MLPs and corporations can be expected to be similar. As a result, the Benchmark Model applies GDP as the measure of the long-term growth rate for both types of entities. In contrast, Mr. Vilbert believes that LP units may not be expected to grow as fast as the MLP itself primarily because MLPs pay out some of their cash flow to general partners. If MLPs and corporations are *assumed* to grow commensurate with GDP, and LP units can be expected to grow at a lower rate than the MLP as a whole, it would follow as a theoretical matter that the growth rate for LP units may be slightly less than GDP. For this reason, Mr. Vilbert has proposed the simple solution of reducing the LP's long-term growth rates to a level that results in a return on equity ("ROE") that is reasonably close to the results of his Benchmark Model.

As shown in Mr. Vilbert's analysis, the proposed simple modification to the Commission's existing model of reducing the long-term growth rate for MLPs to the average of GDP and the rate of inflation, results in an average ROE of 12.44% for a proxy group of six pipeline MLPs. In contrast, Mr. Vilbert's Benchmark Model results in an average ROE of 12.79% for this same proxy group. While the proposed methodology

results in an ROE that is slightly lower than the results of the theoretically more accurate Benchmark Model, INGAA believes that the results are close enough to substantiate the validity of the simpler proposal, at least at the present time.

INGAA would caution, however, that it is proposing this simple solution in an effort to minimize changes to the Commission's current DCF model, and in light of the fact that the results of Mr. Vilbert's Benchmark Model confirm the reasonableness of this approach at this time. However, factors in this analysis, such as inflation rates, could change in a way that results in a divergence of INGAA's proposed solution from actual growth rates of LP units. As more empirical evidence is developed over time regarding the actual growth rates of MLPs and the LP units,[2] adjustments may be required. In other words, INGAA's proposal is a pragmatic approach that is designed to directly address the Commission's concerns with a minimum level of change to the existing methodology. INGAA believes, however, that, as Mr. Vilbert demonstrates in his analysis, the issue is more complex. Should the results of INGAA's proposed expedient modification ever produce unreasonable results, INGAA reserves the right to seek modifications to this approach either pursuant to an industry-wide initiative, or in individual Section 4 rate proceedings.

Finally, INGAA requests that the Commission hear Mr. Vilbert's testimony on behalf of INGAA at the Commission's technical conference on January 23, 2008.

[2] Although Mr. Vilbert's Benchmark Model assumes that the growth rates of LP units will have a tendency to be less than those of corporations due to dilution caused by the issuance of new equity to support growth projects, it is very possible that assumption will not be borne out by experience. Whether the issuance of new equity results in dilution is dependent on the nature of the new growth projects being pursued by the MLP *(i.e.*, whether the particular growth transactions are accretive or dilutive by their nature).

Respectfully submitted,

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UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

REPORT ON THE TERMINAL GROWTH RATE FOR MLPS FOR USE IN THE DCF MODEL

BY
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OF
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ON BEHALF OF
THE INTERSTATE NATURAL GAS ASSOCIATION OF AMERICA

December 21, 2007

I. EXECUTIVE SUMMARY

This report is a response to the FERC's request for comments on the sustainability of the long-term gross domestic product ("GDP") growth forecast as the terminal growth rate of distributions for Master Limited Partnerships ("MLPs") for use in the Discounted Cash Flow model ("DCF model") as specified by the FERC.

MLP distributions to their limited partner units ("LP units") typically exceed comparable distributions by C-corporations. In general, this would seem to make it more difficult for the MLP to grow as rapidly as a C-corporation because the C-corporation retains more earnings for reinvestment. Consistent with that notion, the Commission observes that commenters generally believe that MLPs will have lower growth potential than corporations, because of their high payout of distributable cash flow. Accordingly, the Commission seeks comments on whether its current method of projecting growth adequately reflects the lower growth potential of MLPs, particularly over the long term and, if not, what it should use as an alternative to project MLP distribution growth.

This report addresses these concerns. In evaluating the growth rate for purposes of the DCF model, it is important to remember that the model is attempting to replicate what investors expect the growth rate of dividends or distributions to be. However, in the absence of evidence regarding investors' expectations, experts are asked to fill the void. This report shows that the Commission's premise -- that MLPs have lower growth potential than C-corporations – may be correct only insofar as it focuses on the publicly-traded LP shares, but it is not accurate as applied to the MLP entity as a whole. In fact, MLPs and C-corporations can be expected to grow at the same long-term ("LT") terminal rate, because the high payout ratios do not restrict the growth of the MLP as a whole. This point is discussed in more detail below.

In the event the FERC determines to use a different LT rate for MLPs, this report proposes a very simple modification to the current FERC DCF model for application to the LP units. The current results produced by that simple model are comparable to results produced by a more theoretically complex application of the DCF model to the MLP as a whole (the "Benchmark Model") and can reasonably be relied upon by the Commission in applying its DCF analysis to

the publicly traded LP units of an MLP. It should be emphasized that no change is proposed for application of the FERC DCF model for C-corporations. In addition, it is also worth noting that alternatives to utilizing the DCF methodology remain available, and the Commission should remain open to utilizing these alternatives.

Note: throughout this report the entity as a whole will be referred to as the MLP. The term LP units will be used when referring to the publicly traded LP units.

A. SIMPLE MODIFICATION TO THE FERC DCF MODEL FOR MLPS

The alternative to the current DCF model proposed is to change the "terminal growth rate," which is intended to mean the LT equilibrium growth rate (also referred to as the "steady state" or "constant growth rate") employed in the DCF model. In the current FERC DCF model, the terminal growth rate for C-corporations is assumed to be equal to the forecast of the LT nominal growth rate of GDP and given a weight of one-third. The modification is to change the terminal growth rate to the average of the forecast LT GDP growth rate and the Federal Reserve Bank's ("Fed's") presumed target LT Consumer Price Index ("CPI") inflation rate of about two percent. Currently, the proposed terminal value for the MLP sample companies would be about 3.5 percent.

This proposal preserves as much of the current FERC DCF model as possible while providing reasonably comparable estimates of the cost of equity when compared to the results from the Benchmark Model. At this time, the existing FERC DCF model, using GDP as the long-term growth rate, applied to a sample of MLPs results in a sample average estimated cost of equity slightly greater than the results from the Benchmark Model. In contrast, the results from the modification of the FERC DCF model, using the average of GDP and the Fed's target CPI rate, are slightly lower than the results from the Benchmark Model. Currently, the difference in the two estimates is about 50 bps with the results of the Benchmark model roughly in the middle.

B. OUTLINE OF JUSTIFICATION FOR THE PROPOSED MODIFICATION

The FERC has most recently focused on the sustainability of the LT earnings growth rate forecasts for the LP units. As discussed in more detail in Section II below, the concern is plausible for the LP units' growth rate but not for the MLP as a whole. If the DCF model is

applied to the LP units, an adjustment to the LT growth rate is arguably appropriate. The justification for selection of the average of forecast LT GDP growth rate and the target inflation rate as the terminal growth rate for use with LP units is provided below, but it should be recognized that the terminal growth rate for use in the model is an assumption, whether for an MLP or a C-corporation.[1]

The second part, and the most important part, of the justification for the proposed modification is that the results from applying the modification to a sample of LP units are comparable to the results from a more complex and more theoretically accurate Benchmark DCF Model applied to the MLPs as a whole. The more complex model serves as a benchmark against which to measure the results of the proposed modification. The Benchmark Model is designed to capture as many aspects of applying the DCF model to a sample of MLPs as possible, which makes it more complicated and more theoretically accurate. Because the results are currently comparable between the two models, the Commission has some assurance that the simplified model is providing reasonable estimates at this time.

CAVEAT: The fact that results of the two models are currently very similar does not mean that they would always be so. If the simplified model were adopted, it would be important to reaffirm periodically that the results remain comparable.

II. MLP GROWTH RATES

A. WHAT GROWTH RATE?

To discuss MLP earnings growth rates for use in a DCF model, it is important to recognize that two different growth rates are potentially relevant, depending on whether one wishes to estimate the cost of the publicly traded LP equity only or one wishes to estimate the entire MLP's cost of equity. In order to obtain an accurate picture of the cost of capital for an enterprise, it is, of course, necessary to consider all sources of capital. When estimating the cost of LP equity alone,

[1] The determination of a terminal growth rate is necessarily uncertain because it is inherently so difficult to predict investors' expectations the farther out one goes in time. There is no completely satisfying LT growth rate assumption for either C-corporations or MLPs. By contrast, although the ST growth rates in the model are also "forecasts," they are the result of careful analysis by security analysts based upon the best available current information spanning a much short period, generally five years. They are therefore the most reliable data available, and moreover, other than the available short term ("ST") growth rates forecasts, it is not clear what other growth rate forecasts investors may rely on, if any.

growth in earnings per LP share is relevant. Earnings growth for the MLP as a whole is needed to estimate the MLP's entire cost of equity.[2] In general, these two measures of growth will differ 1) because an increasing proportion of earnings accrues to the General Partner ("GP") due to its equity ownership interest (about two percent) and the Incentive Distribution Rights ("IDRs"), which appear to be a feature of all MLPs; and 2) because MLPs may be presumed to issue new equity in order to sustain growth in the long run. As a result, terminal growth in earnings per share (used to estimate the cost of LP equity) will probably be lower than the terminal growth of the MLP's earnings as a whole (used for the MLP's entire cost of equity).

Because there is, in general, only one type of common equity in a C-corporation, there is no need to distinguish between the entire entity and the individual common stock when applying the DCF model to a C-corporation.

B. MLP INCENTIVES FOR GROWTH

At present, MLPs in general distribute a relatively high portion of their available cash flow. This policy has raised the question of how rapidly the distributions can grow compared to a C-corporation, particularly in the long term. IDRs provide the GP a very powerful incentive to grow earnings and distributions for the benefit of the MLP because the GP's share of distributions will grow only as the distributions to the LP units increase and move into different tiers. For C-corporations, the management does not have IDRs so the incentive to grow rapidly may not be as strong.

Incentive Distribution Rights

IDRs are set up to encourage the GP to find ways to benefit LP owners by increasing distributions to the LP units. As distributions increase, the GP's share of the total increases as the level of distributions reaches the "tiers" specified in the MLP's charter. As each tier is reached, a higher percentage of the incremental distributions is paid to the GP. At current rates of growth of distributions, it will take anywhere from 15 to 25 years for the typical MLP's distributions to reach the point at which both the GP distributions and the LP distributions are

[2] The DCF model focuses on cash dividends (C-corporations) or cash distributions (MLPs), but cash flow comes primarily from earnings growth. The growth of dividends or distributions can vary from the growth of earnings in the short-term, but in the long-term, the average growth of earnings and dividends/distributions must be the same.

growing at the same rate in the highest distribution tier. The distributions of most MLPs will enter the highest tier sooner than that but the total distributions will not be divided in approximately equal proportions until much later.

The earnings growth rates reported by security analysts are for the LP units. In general, growth rate estimates for the MLP are not reported, but they can be calculated relatively easily by determining how much of the distribution is owed to the GP. The forecast earnings growth for the MLP as a whole can be determined by calculating how fast the MLP must grow its earnings in order to meet the analysts' forecast of expected distribution growth for the LP units. Please see the attached Technical Appendix for a numerical demonstration of this calculation.

Note that, in general, a C-corporation does not have this issue because there is only one class of equity interest (common stock) and earnings are shared equally among the one class of common stock holders.[3]

Consider the following example. Initially the GP's two percent equity ownership receives two percent of the distributions, but in the top tier, the GP can receive as much as 50 percent of any increase in distributions even though the GP still owns only 2 percent of the equity. The graph below shows the rate of growth of GP distributions as the distributions to the LP units increase and shows how powerful the incentive to grow distributions for the benefit of both the LP units and the GP is likely to be. The GP's share of the total distributions approaches 50 percent as the size of the LP units' distribution increases to high levels.[4]

[3] Some C-corporations have more than one type of common stock, but the payment rules for different categories are not generally similar to IDRs.

[4] This assumes the highest tier allocates 50% of the incremental distributions to the GP.

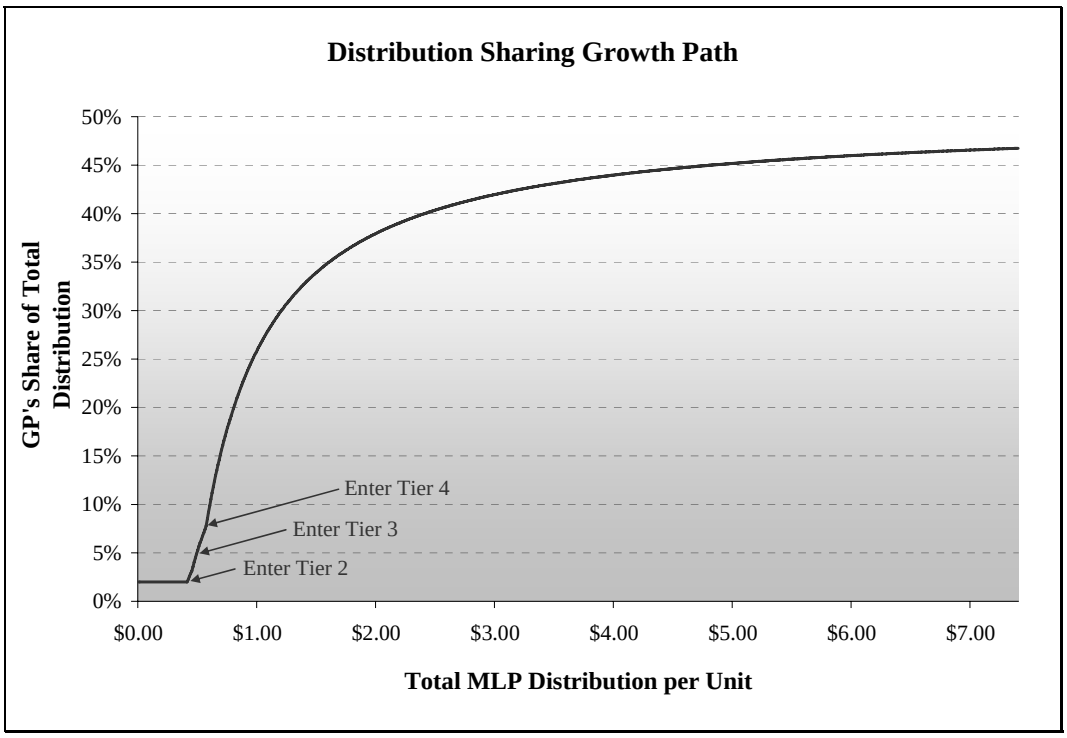

Figure 1: Share of total MLP distributions flowing to the GP as total distributions grow.

Because of the incentive provided by the IDRs, it is likely that an MLP will maintain a high growth rate for an extended period. Estimating how long that period may be will require a number of assumptions, but certainly 10 to 20 years is possible, if not likely.[5] In the Benchmark Model, I have used an estimate of 15 years.[6] In other words, the Benchmark Model assumes that it takes a total of 15 years for the distribution growth rate to reach the terminal GDP growth rate.

C. How is Growth Achieved?

Evaluating the sustainability of a terminal growth rate to apply to a sample of MLPs requires understanding how growth in earnings and distributions per share can be achieved for an MLP or C-corporation. One way is to invest in additional (regulated) assets which earn a higher return than the cost of capital used to purchase the assets. Another way to grow earnings is to increase efficiency so that expenses are reduced. Both MLPs and C-corporations can also grow earnings per share by increasing the financial leverage of the company. By using debt to purchase new

[5] Note that the years that distribution growth may exceed GDP growth (10-20 years) is different from the time it would take for the distributions to the GP to reach about 50% of the total distributions (15-25 years).

[6] See the Technical Appendix for how this assumption enters the model.

assets, earnings per share will increase, but this is achieved by increasing the financial risk of the company's equity. The increased earnings per share are compensation for the increased financial risk inherent in a more leveraged capital structure. Increasing leverage is not likely to increase the market value of equity because the increased risk of the equity is likely to offset the increased earnings per share. There are likely to be other ways to grow as well, but these are the primary ways.

Investing in additional assets financed with a mix of debt and equity can increase earnings per share particularly if the MLP or the C-corporation can issue new equity at a market-to-book ratio greater than 1.0. This is because the book value (i.e., rate base) of the new assets will increase the average rate base of all of the equity of the MLP or the C-corporation. Earnings per share also increase if the new assets earn a greater rate of return than the old assets. A regulated company cannot generally expect to earn a higher rate of return on new regulated assets than on current regulated rate base so growth can depend critically on the market-to-book ratio. Note that simply purchasing pipeline assets may not increase earnings per share if the price paid is greater than the rate base value of the assets because paying greater than book value dilutes the advantage of having a market-to-book ratio greater than 1.

D. SUSTAINABLE LONG-TERM GROWTH

Currently, the FERC has asserted that MLPs will have lower growth potential than that of C-corporations, but the forecast ST growth rates for MLPs are generally higher than GDP growth. Predicting how long an MLP can maintain a high payout rate and continue to grow as fast or faster than GDP is difficult, but it is certain that relatively high growth rates cannot be maintained indefinitely for MLPs (or for C-corporations). That observation raises two additional questions directly relevant to DCF estimation:

1) What is a sustainable LT growth rate for an MLP?

2) What is the path of growth rates as the ST growth rate trends to the (generally) lower LT (sustainable) growth rate? In other words, how long does it take for the ST growth rate to reach the LT growth rate for an MLP?

First, note that these questions are not unique to MLPs -- they are equally applicable to C-corporations. The FERC DCF method answers the first question for C-corporations using the

forecast of LT GDP growth. The second question is addressed by weighting the ST growth rate by two-thirds and the LT growth rate by one-third.[7] It is important to realize that the current FERC DCF method is a compromise because there are no definitive answers to the two questions above for C-corporations or for MLPs.

For the LP units, it is likely that the LT growth rate will be lower than the LT growth rate for a C-corporation given the payout policies of MLPs. The partnership agreement establishes a distribution policy for the MLP which generally encourages paying out a substantial portion of its annual cash flow. Both C-corporations and MLPs generally retain enough cash flow to maintain their property, plant and equipment ("PP&E") to offset annual depreciation; a C-corporation, however, retains more of its cash flow than a similar MLP. This means that the MLP must issue more LP shares than an otherwise identical C-corporation to finance investment in additional assets, all other factors being equal. Put differently, with the same rate base and allowed return on equity, the earnings growth rate for the individual LP units will be lower because the MLP will have more LP shares outstanding as a consequence of a higher payout ratio and because of the portion of distributions paid to the GP.

E. CAN AN MLP GROW AS FAST AS A C-CORPORATION?

Does a generally high payout policy that results in the distribution of substantially all of an MLP's cash flow mean that an MLP simply cannot achieve the same terminal growth at the entity level as a C-corporation? The answer is no. There is no reason or barrier in principle preventing an MLP as a whole from growing as rapidly as a C-corporation; both have an equal opportunity and ability to grow earnings and distributions, and both can achieve growth in very similar ways. There are, however, factors that can affect the relative growth rates of the two business organizations.

Like a C-Corporation issuing stock, MLPs can issue new LP units to raise equity to finance investment in additional assets. If the MLP has been successful in the past with regard to increasing distributions, it is highly likely that new equity can be raised. There will be some issuance costs but these costs are generally fairly small. Moreover, as noted above, the IDRs

[7] This roughly captures the impact of the decreasing growth rate with a single lower number that can be used in the constant growth DCF framework.

provide the GP an incentive to grow that on balance may result in the growth rate of LP distributions matching or even exceeding the growth rate for some C-corporations for an extended period of time.

In contrast, because C-corporations in general retain more of their net income, they do not need to issue as many additional shares to finance growth. Thus, achieving similar growth rates requires the MLP to issue more shares of equity than a C-corporation would need to issue. The consequence is that even though the overall growth rate for a C-corporation and an MLP may be identical, the growth rate of the publicly traded LP units will be lower than for the common equity shares of a similar C-corporation.

F. Terminal Growth Rates for the MLP and the LP Units

As distributions grow, at some point, approximately 15-25 years or more in the future,[8] the LP distributions will be in the highest tier, and the GP and the LP units as a group will each receive 50 percent of the distributions.[9] If the terminal growth rate for the MLP is equal to the LT GDP growth, the GP's distributions and the LP units' distributions in aggregate will grow at the GDP rate. However, it must be remembered that the MLP's growth is financed in part by issuing additional LP units. In theory, therefore, the terminal growth in an LP's earnings per share may be lower than the terminal growth rate of C-Corporations that fund growth more through retained earnings. Both C-corporations and MLPs issue equity in the expectation of investing in assets that provide accretive earnings growth per share including through building Greenfield projects or purchasing additional assets. While one could question how long MLPs as a group can continue to find projects that are accretive to earnings, the evidence to date is that MLPs have been able to maintain growth for an extended period. Nonetheless, for purposes of my theoretical analysis, I assume that LP growth (as opposed to MLP growth) will be lower than C-Corporation growth due to MLPs' issuance of more LP units to fund growth. In other words, when the MLP is growing at the GDP rate, the distributions must be growing at a much slower rate for the individual LP units because the growth is being shared by more LP units and the GP.

[8] This estimate depends upon the current tier and the forecast growth rate for each MLP. Some MLPs are already in or near the highest tier.

[9] This assumes that the highest tier provides a 50 percent incentive distribution to the GP. If the highest tier were lower, the GP's share of total distributions would approach that percentage, leaving the remainder for the LP units.

If the terminal growth rate for an MLP is LT GDP growth, the next question is "what is the terminal growth rate for the LP units?" As noted above, it must be acknowledged that there is no definitive answer to this question. Just as for the MLPs and C-corporations which have an assumed growth rate equal to LT GDP growth, it is necessary to assume a terminal growth rate for LP units. However, we do have some available information that we can use to improve the expected accuracy of the assumed level of growth.

Based upon the assumption that the terminal growth rate for the MLP as a whole is equal to the forecast LT GDP growth rate and that investment in additional assets by an MLP requires the issuance of additional LP shares as well as debt, the terminal growth rate of distributions for the individual LP units will be lower than for the MLP as a whole. How much lower? Again, this requires an assumption, but it seems reasonable that the higher the GDP growth, the higher the growth of rate of earnings for MLPs, C-corporations and LP units, so the growth rate for LP units should also be tied to GDP growth. It is also desirable that the assumed value of the terminal growth rate should be observable so that once the approach is agreed upon, determining the value to use in the model should not be a source of additional debate.[10]

The proposed value for the terminal growth rate for the LP units is the average of the forecast LT GDP growth rate and the Fed's target rate of inflation. It is a value that is observable and tied to but less than the forecast LT GDP growth rate. Growth for LP units, although less than the growth rate for the MLP as whole, is likely to be greater than inflation because growth at the rate of inflation would imply little to no real growth in earnings for the MLP. Recall that nominal GDP growth will exceed the rate of inflation if there is a real (i.e., inflation adjusted) increase in GDP. Therefore, a terminal growth rate for LP units equal to the average of the forecast of inflation and GDP growth is a reasonable compromise benchmark for the terminal growth rate of the LP units in the DCF model at this time.

Finally, the proposed terminal growth rate for LP units is not recommended for C-corporations or for MLPs as a whole. The FERC should maintain its current assumption of a terminal growth rate equal to GDP growth because one of the attractive aspects of a growth forecast equal to GDP is that the company or industry remains a constant portion of GDP. If a rate less that GDP

[10] The presumed Fed target inflation rate is derived from various speeches of the Fed's Board of Governors. It is not a published estimate because the Fed does not purport to set a target, but the speeches indicate that a reasonable target would be about 2 percent.

were used for either MLPs or C-corporations, it would mean that the analyst believed that the industry or company would become an increasingly smaller part of the economy. In addition, the forecast nominal GDP growth rate will always exceed the inflation rate as long as there is real, (i.e., inflation adjusted) growth in the economy. Setting the terminal growth rate in the model at the rate of inflation for C-corporations or MLPs would mean that neither would have any real growth in earnings or distributions. Therefore, maintaining the assumption of a terminal growth rate of GDP for both the C-corporations and MLPs is likely to be the best available estimate.

G. SUMMARY

Applying the DCF model to a sample of MLPs requires careful consideration of the parameters of the model. Specifically, analyst forecasts of earnings and distributions growth are for the LP units. Because of the IDRs, the earnings for the MLP as a whole will be higher than for the LP units. In other words, there are two different growth rates, one for the MLP and one for the LP units. The IDRs provide an incentive to the GP to grow distributions for the benefit of the LP units as well as for itself. As a result, the current relatively high payout ratios and ST growth rates, generally greater than GDP growth, are likely to persist for many years. Even when growth slows, there is no reason that the terminal growth rate for the MLP will not be the same as for a C-corporation. If the terminal growth rate for MLPs (and for C-corporations) is equal to the LT GDP growth rate, it is likely that the terminal growth rate for the LP units will be lower because of the increase in the number of LP units outstanding.

III. IMPLEMENTING THE DCF MODEL FOR AN MLP SAMPLE

Section II outlined some of the differences between an MLP and a C-corporation that should be considered when using the DCF model to estimate the cost of equity. The remainder of this report focuses on estimating the cost of equity for a sample of MLPs by application of the DCF method.

It is important to note that there are alternative costs of equity estimation models such as the risk positioning model (e.g., the Capital Asset Pricing Model (CAPM), the Empirical CAPM or the risk premium model) or the Fama-French model. These models may actually be preferable to the

DCF model to estimate the cost of equity for an MLP sample because some of the complications of the DCF model with regard to an MLP can be avoided. In addition, there has been no discussion of the effect of financial risk on the cost of equity in this report. This is an important topic, but neither the alternative models nor adjusting for financial risk are addressed in this report. The purpose here is to answer the question of how best to apply the DCF model to MLPs.

A. WHAT CONSTITUTES AN ACCEPTABLE MODEL?

The first issue is to determine or specify the conditions necessary for an acceptable model. For any model, there is a tradeoff between accuracy and simplicity. Ultimately, we would like a model that is as accurate as possible but that is also as simple as possible. Of course, because we do not know the "true" cost of equity, we must estimate it. This means that there is no definitive way to determine whether any estimation method is the "most accurate". However, some methods will be more in accord with financial theory, model more of the characteristics of an MLP and will provide more consistent estimates than other possible methods.

For example, the FERC DCF model for natural gas pipelines is quite simple and until recently has provided estimates of the cost of equity that seemed reasonable, but the number of available C-corporations to include in the sample has declined. The sample of C-corporations is now so small that it calls into question the reliability of the cost of equity estimates. Because many FERC-regulated natural gas pipelines are owned by MLPs, it is logical to add MLPs to the list of companies from which to choose a sample.

B. CAPITAL STRUCTURE ISSUES TO CONSIDER FOR APPLYING THE DCF MODEL TO MLPS

One difficulty with estimating the cost of equity for a sample of MLP companies is that the GP's portion of the equity ownership is not traded in the market.[11] To understand why this is a problem requires an understanding of the distribution of an asset's risk to investors. In corporations, the risk of the assets is generally split among three types of investors: common

[11] Although a number of MLPs have issued traded shares that capture the GP equity value, none of the MLPs that are primarily natural gas pipelines currently do so. The closest is Enterprise Product Partners, LP, which owns a mix of oil and natural gas pipelines.

shareholders, preferred shareholders, and debt holders.[12] Market information on prices and returns are available for all three types of investors.

For an MLP, the risk of the assets is split among a GP, the limited partners, and debt holders. As with a corporation, the risks are divided into three parts, but the risk characteristics of the parts differ from those of a corporation. The presence of the GP does not add additional risk to the underlying business operations of the MLP – the overall risk of the assets should be the same regardless of whether they are organized in an MLP or a C-corporation, and so should their cost of capital. The GP does, however, affect how that risk is divided.

Professors Franco Modigliani and Merton Miller provided the initial analysis showing that capital structure shouldn't affect the value of the firm. In other words, in an efficient market the value of a firm is unaffected by how that firm is financed. The table below illustrates the point, showing that the total cost of capital for the assets (r_A) is unchanged no matter how the equity is proportioned.

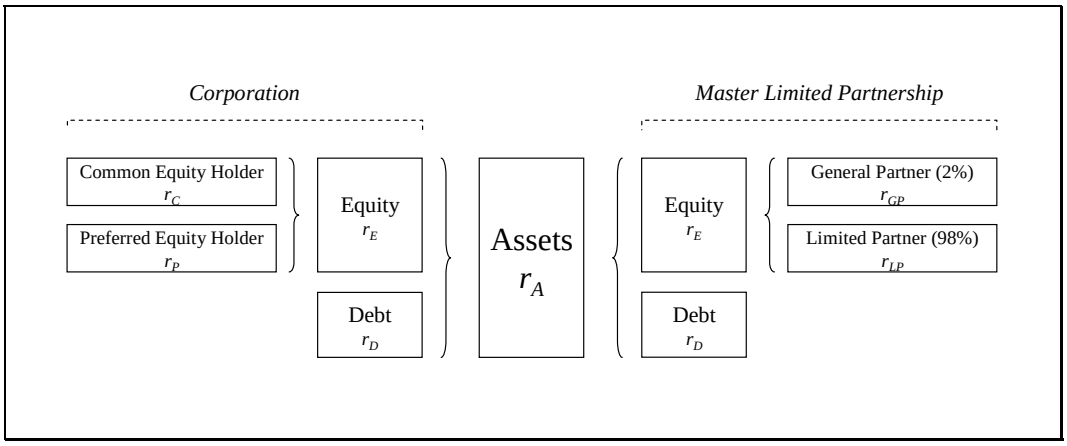

Figure 2: Division of business risks for a corporation and an MLP.

C. COST OF EQUITY CAPITAL

As highlighted in the figure above, the GP and LP unit holders together share the risk after debt holders have been paid, and each requires a rate of return for bearing that risk. Regulators compensate for these risks by allowing investors to earn a fair and reasonable return on their investments. The rate of return expected by investors should be equal to the cost of capital of the

[12] Preferred equity is more like debt in terms of its required rate of return and scheduled payments. In general, preferred dividends are specified in terms of amount and timing, but failing to pay preferred dividends does not force bankruptcy unlike missing a debt payment.

firm's assets (r_A). That is, the assets of the firm must earn a rate of return that appropriately compensates investors for bearing the risk of the assets. A regulated rate of return that lies below the cost of capital will deter investors from investing much needed capital to maintain infrastructure, while a rate that is too high makes consumers pay too much for the service that is provided. Estimating the appropriate cost of capital that balances between the two is one of the main objectives for regulators.

To estimate r_A for an MLP, we would need to estimate r_{GP}, r_{LP}, and their relative market values.[13] There is, however, little or no market data available for the GP units, which make it more difficult to estimate the GP's cost of capital. Information is available to estimate $r_{LP,}$ but the LP units represent only a portion of the firm's total market value of equity. This means that even if we estimate the cost of equity for the LP units perfectly, we will not have an estimate of the total risk of the assets because we have limited data for the GP's share of the equity.

In applying the DCF model to MLPs, the FERC has expressed a number of concerns that INGAA addressed in earlier comments. In its November 15th Notice, the Commission focused on the terminal growth rate. The Commission asks

- "Whether its current method of projecting growth adequately reflects the lower growth potential of MLPs, *particularly over the long term[.]"*[14] Relatively high payout policies in conjunction with growth rate forecasts that are greater than GDP growth may not be sustainable in the long-term. The implication is that the terminal growth rate is likely to be lower than the forecast of GDP growth.

The correct growth rate to use in the DCF model is always the controversial part of the model whether for C-corporations or for MLPs. A high current dividend yield may simply reflect low

[13] This report is based on the assumption that the underlying business risks of a pipeline organized as an MLP are the same as a pipeline organized as a C-corporation. In other words, the organizational structure does not affect the overall cost of capital for the assets.

[14] In this context, the Commission refers to a newsletter published by an investment banker that uses a projected MLP long-term annual growth rate of 2.5 percent (as compared to a currently projected GDP growth rate of approximately 4.5 percent). Notice at P 5 note 2, citing *MLPs: Safe to Come Back into the Water*, Wachovia Capital Markets, LLC, Equity Research Department, at 9-10 (August 20, 2007). Based on conversations with the authors, the LT growth rates employed there (which actually range between 1.5 and 3 percent), were based on their analysis of the characteristics of the individual MLPs. Importantly, and consistent with the principal finding of this report, those estimates were of LT growth of the publicly-traded LP shares alone, not for the MLPs as a whole.

growth prospects in the future, but the key questions are when and how quickly the ST growth rate may taper off to a lower terminal growth rate, and if so, what is the lower growth rate likely to be. Of course, the accuracy of the DCF model depends upon using a correct growth rate.

D. DCF MODELS

Because the MLP corporate structure is different from that of a C-corporation, the differences must first be understood before attempting to determine whether any modifications to the DCF model or its parameters are necessary to estimate the cost of equity accurately.

First, recall that a portion of the equity of an MLP is owned by the GP, but the lack of price data on the GP claims makes it impossible to estimate directly the MLP's overall cost of equity. It is important to note that the GP's earnings will be derived from the allowed return on equity on the rate base so it is important that the allowed return on equity be high enough to provide the required return on equity for all of the MLP's equity, the LP and GP shares alike.

Second, MLPs have an additional complication with regard to growth rates. Analyst earnings growth forecasts are for the LP units. (See note 14.) This means that the earnings growth of the MLP as a whole must be *higher* than the forecast growth rate for the LP units because the GP claims a higher portion of the earnings as the distributions to LP units increase. LP distribution growth will always be less than or equal to the MLP growth rate because of the IDRs. The distributions to the LP shares over the long term will be less than the earnings growth for the MLP because the GP receives an increasing portion of the distributions as an incentive. In other words, the incremental cash flow owed to the GP increases rapidly as the distributions grow to higher tiers. For many MLPs, when the distribution level reaches the top tier, the GP receives 50 percent of all incremental distributions. Of course, this is not an issue for C-corporations which do not have IDRs.

Finally, LT growth rate estimates (i.e., growth rates for periods longer than five years) are generally not available for either MLPs or for C-corporations. Applying the DCF model to either MLPs or C-corporations requires estimating earnings growth rates after year five, including estimating the terminal growth rate and the path to the terminal growth. Whether a terminal growth rate of forecast LT GDP is sustainable for MLPs is the essence of the FERC's stated concern with regard to growth rates for the MLP sample companies.

E. DCF GROWTH RATES

As noted above, estimating the growth rate in the DCF model is always controversial because a one percentage point difference in the growth rate estimate results in more than a one percentage point difference in the estimated cost of equity. Most DCF applications make very strong (i.e., unrealistic) assumptions that yield a simplification on the cost of capital. The simple DCF model, for instance, assumes that a company's earnings (and dividends, prices, and book value) grow at a constant rate forever. In addition, the model assumes that investors expect the cost of capital to be the same in all future years. Violations of these expectations can bias (in either direction) the DCF estimate of the cost of capital.

Estimating the cost of capital with a constant growth DCF approach for a sample of either MLPs or C-corporations is therefore likely to be unreliable. A simple DCF model, as in any DCF model, requires a distribution yield and a growth rate. The higher the distribution yield or growth rate, or a combination of both, will yield a higher return on equity. MLPs tend to have slightly higher distribution yields than corporations, because they pay out a larger percentage of their earnings to unit holders. In an efficient market, the stock price of an MLP should reflect the higher expected distributions and value the stock in recognition of such distributions. If the stock price diverges, arbitrage should bring it back into line.[15]

Finding the right growth rate(s) is usually the "hard part" of a DCF application whether for an MLP or a C-corporation. The original approach to estimate *g* relied on average historical growth rates in observable variables, such as dividends or earnings, or on the "sustainable growth" approach, which estimates *g* as the average book rate of return times the fraction of earnings retained within the firm. But it is highly unlikely that historical averages over periods with widely varying rates of inflation, interest rates and costs of capital, such as in the relatively recent past, will equal current growth rate expectations.

A better approach is to use the growth rates currently expected by investment analysts, if an adequate sample of such rates is available. If this approach is feasible and if the person estimating the cost of capital is able to select the appropriate version of the DCF formula, the DCF method should yield a reasonable estimate of the cost of capital. However, for the DCF

[15] In this case, arbitrage refers to the actions by investors to buy investments with higher expected returns relative to their risk and to sell investments with lower expected returns relative to their risk.

approach to work the basic stable-growth assumption must become reasonable and the underlying stable-growth rate must become determinable *within the period for which forecasts are available*. Because growth rates are likely to vary in the short run before settling down into a terminal growth rate, it is better to rely on a multi-stage DCF rather than the simple DCF. The Multi-Stage model takes the analyst growth rates, and adjusts them over time to a steady state (usually a long-term GDP forecast). A two-stage model compensates for the unrealistic assumption that growth rates should be constant and allows growth rates to vary before settling down in the sustainable LT growth rate.

F. POSSIBLE DCF MODELS FOR MLPS

This report proposes a simple adjustment to the current FERC DCF model as a compromise to address the problems that are of concern to the Commission. Specifically, it is proposed that the Commission apply the current FERC DCF model to the LP units, but use a terminal growth rate equal to the average of the LT GDP growth rate and the Fed's target LT CPI inflation rate instead of simply GDP growth. This is a very simple solution and retains as much as possible of the current FERC DCF model applied to C-corporations, but it is only recommended here because the current results from the modified FERC model are comparable to a more complex and more theoretically accurate Benchmark DCF model. The second, more complex model, attempts to capture the differences between MLPs and C-corporations that are likely to affect the estimated cost of equity.

To reiterate, the proposed compromise model simply treats the LP units the same as a C-corporation and applies the standard FERC DCF model with one modification. It substitutes the average of forecast LT GDP growth and LT target CPI inflation for the forecast of LT GDP growth as the terminal growth rate in the model. In other words, the distribution yield is calculated in the standard way for the LP using the full distribution and the growth rate is the weighted average of the ST (i.e., 5-year) analysts' growth forecast (two-thirds weight) and the average of the LT GDP and the LT inflation target (one-third weight). This option is based on a sense of "rough justice" in that the LP units are less risky than the MLP equity as a whole because of the GP share, but the terminal growth rate for the LP is likely to be lower than the terminal growth rate for the C-corporations or for the MLP as a whole. No change is proposed

for the C-corporations. Specifically, the forecast of the terminal growth rate would continue to be the forecast LT GDP growth rate.

1. Details on the Benchmark Model

The Benchmark Model applies the DCF model to the MLP as a whole. Because it attempts to model the differences between an MLP and a C-corporation, it is expected to provide more accurate estimates of the cost of equity for the MLP. It attempts to capture the effect of the GP on the risk of the MLP and the differences in growth rates between the LP units and the MLP. The Benchmark Model is discussed in detail in the Technical Appendix. The Technical Appendix lays out the calculations and assumptions involved in the model so that anyone wishing to evaluate the approach has access to all of the information necessary to reproduce the results.

The current FERC DCF method is very simple and straightforward, but it does not take advantage of the computing ease and power available in current computer programs. More complicated models can easily be handled by current programs which would make the task of estimating the cost of capital accurately easier. The Benchmark Model is a true two-stage DCF model which means that the forecast dividend growth rate differs over time. Specifically, the growth rate is constant for the first five years and then trends linearly to the presumed LT sustainable growth rate by year 16 (a linear trend to forecast GDP growth over a 10 year period). The growth rate in the first five years is the growth rate for the MLP as whole which is derived from knowing the growth rate of the LP share, the tier structure of the MLP and where in the tier the MLP's most recent distribution lies. The LP stock price is also increased by an amount that recognizes that the value of the GP share and the LP units is greater than the value of the LP units alone. The calculation of the increase in the LP price necessary to recognize the GP portion of equity is described in detail in the Technical Appendix. The terminal growth rate is assumed to be the same as for the C-corporations, i.e., the forecast of LT GDP growth.

2. Comments on the Benchmark Model

As noted above, the motivation for the more complex model is to provide a benchmark against which to compare the results from other, simpler models. It is expected that the Benchmark Model will provide a "better" estimate of the cost of equity for a sample of MLPs, because it

attempts to recognize the role of the GP in determining the required return on equity. It does this by recognizing that the growth rate of the MLP must be greater than the forecast growth rate of the LP units and recognizing that the GP equity is both riskier and likely to have a higher market value than the LP equity relative to the current value of the distributions it receives. The GP equity is riskier because the cash flows to the GP are more variable. As MLP earnings increase or decrease, the GP's share of distributions increases or decreases more rapidly than the LPs' share.

Of course, it is an assumption that the Benchmark Model provides a better estimate of the cost of equity because no one knows the *true* cost of equity. It must be estimated, but some models incorporate more of the underlying features of the investment than others at the expense of more complexity. The Benchmark Model adds complexity to replicate more precisely the cash flows and other aspects of an MLP.

Specific comments:

First, no step in the application of the Benchmark Model requires judgment once the parameters of the model are agreed upon.

Second, the Benchmark Model considers both the GP's and the LP's equity shares.

Third, the Benchmark Model could be applied equally to MLPs or C-corporations.

Fourth, the LT growth rate is assumed to be equal to forecast GDP growth, but the path to get to the terminal growth rate requires an assumption on how fast the transition is likely to take.

Fifth, the Benchmark Model increases the price of the GP equity share by more than the GP's current share of distributions, because the expected growth rate of distributions to the GP is higher than for the LP units. This adjustment has the effect of reducing the estimated cost of equity slightly when the Benchmark Model is applied to MLPs. Therefore, the GP adjustments made in the Benchmark Model include elements that can both increase and decrease the estimated cost of equity when applied to MLPs.

It is important to recognize that the LP unit owners take into account the distribution rights of the GPs when making their investment decisions. Therefore the market price of the LP units fully reflects the IDR structure of the MLP.

3. Comparison of the Results

The table below shows the results of the Benchmark Model applied to a representative sample of MLPs compared to the proposed modified version of the FERC DCF model for pipelines.[16] As can be seen, the proposed modification to the FERC DCF model actually produces results that are slightly less than the Benchmark analysis. However, the two models currently provide average cost of equity estimates for the sample that are relatively close, although estimates for the individual companies vary. This result is a function of financial data used at the time of the preparation of this report and should not be interpreted to mean that the results will always be this close. However, looking at the individual company results suggests that the two models will produce numbers which are "close" to one another. This is the concept of rough justice that is the motivation to change the terminal growth rate for applying the FERC DCF method to the LP units, as slightly modified, in order to preserve the simplicity of the current FERC DCF model. Note that had the current FERC DCF method been applied to the MLP sample, the result would have been 12.94 percent, about 50 basis points higher, reflecting the higher terminal growth rate in the model. Although the results of both the modified and current FERC DCF model when applied to the LP units is within the range of estimation error for the Benchmark Model, the modification to the FERC's current DCF model is proposed primarily in recognition that the terminal growth rate for the LP units is likely to be lower than for the MLP as a whole.

[16] I have not examined, nor have I expressed an opinion on, the issue of the composition of the proxy group.

Table 1: Comparison of DCF Results by Model.

	Benchmark DCF Model on the MLPs (Multi-Stage) [1]	Proposed Modified FERC DCF on LP Units [2]
Boardwalk Pipeline Partners, L.P.	12.16%	12.08%
Growth Rate	*(12.53%)*	*(6.69%)*
Oneok Partners, L.P.	12.55%	11.82%
Growth Rate	*(10.11%)*	*(5.37%)*
TC Pipelines, L.P.	11.30%	10.91%
Growth Rate	*(6.30%)*	*(3.82%)*
Enbridge Energy Partners, L.P.	12.62%	12.17%
Growth Rate	*(8.37%)*	*(4.74%)*
Enterprise Products Partners, L.P.	13.93%	13.77%
Growth Rate	*(10.49%)*	*(7.31%)*
Kinder Morgan Energy Partners, L.P.	14.17%	13.89%
Growth Rate	*(9.91%)*	*(7.06%)*
Average	12.79%	12.44%

Sources and Notes:

[1]: Growth rates are 5-year forecasts for the entire MLP based on forecasts for the LP units (see text). Terminal growth rate is assumed to be the forecast GDP growth rate of 4.92%. This is reached after five years of short-term growth and ten years of detrending.

[2]: Growth rate calculated as: ((2/3) x Analysts' Forecasts) + ((1/3) x Terminal Growth Rate). Terminal growth rate per share is estimated at 3.46%. It is computed as the average of forecast GDP growth and a presumed 2% targeted inflation rate by the Federal Reserve.

IV. SUMMARY OF CONCLUSIONS ON MLP GROWTH AND THE DCF MODEL

The MLP structure generates a number of issues for the application of the DCF model. The growth rate is of critical importance in the DCF model, but there is no forecast for earnings growth rates for longer than five years. In addition, the equity in an MLP is divided between the LP units and the GP, but market information on prices and growth rates are generally only available for the LP units. Because of the IDRs, the GP has a powerful incentive to work to ensure that the MLP's earnings grow as rapidly as possible which benefits both the LP unit holders and the GP. As a result, it is likely that the LP units will have high distribution yields as well as 5-year earnings growth forecasts that exceed GDP growth. It is also likely that the relatively high 5-year earnings growth rates cannot be sustained indefinitely, although the

incentive provided by the IDRs make it probable that the MLP will maintain high growth rates for an extended period.

The proposed option to apply a slight modification to the current FERC DCF model to the LP units is admittedly a simplification, but the results from the simplified model currently track the results of the more complex and more theoretically accurate Benchmark Model closely. Although that outcome may not always be true, the availability of the Benchmark Model or other alternative theoretical models can serve periodically as a check on the reasonableness of the simplified model.

APPENDIX A

RESUME

MICHAEL J. VILBERT **PRINCIPAL**

Michael Vilbert is an expert in cost of capital, financial planning and valuation who has advised clients on these matters in the context of a wide variety of investment and regulatory decisions. He received his Ph.D. in Financial Economics from the Wharton School of the University of Pennsylvania, an MBA from the University of Utah, an M.S. from the Fletcher School of Law and Diplomacy, Tufts University, and a B.S. degree from the United States Air Force Academy. He joined The Brattle Group in 1994 after a career as an Air Force officer, where he served as a fighter pilot, intelligence officer, and professor of finance at the Air Force Academy.

REPRESENTATIVE CONSULTING EXPERIENCE

- In a securities fraud case, Dr. Vilbert designed and created a model to value the private placement stock of a drug store chain as if there had been full disclosure of the actual financial condition of the firm. He analyzed key financial data and security analysts' reports regarding the future of the industry in order to recreate pro forma balance sheet and income statements under a variety of scenarios designed to establish the value of the firm.

- For pharmaceutical companies rebutting price-fixing claims in antitrust litigation, Dr. Vilbert was a member of a team that prepared a comprehensive analysis of industry profitability. The analysis replicated, tested and critiqued the major recent analyses of drug costs, risks and returns. The analyses helped develop expert witness testimony to rebut allegations of excess profits.

- For an independent electric power producer, Dr. Vilbert created a model that analyzed the reasonableness of rates and costs filed by a natural gas pipeline. The model not only duplicated the pipeline's rates, but it also allowed simulation of a variety of "what if" scenarios associated with cost recovery under alternative time patterns and joint cost allocations. Results of the analysis were adopted by the intervenor group for negotiation with the pipeline.

- For the CFO of an electric utility, Dr. Vilbert developed the valuation model used to support a stranded cost estimation filing. The case involved a conflict between two utilities over the responsibility for out-of-market costs associated with a power purchase contract between them. In addition, he advised and analyzed cost recovery mechanisms

that would allow full recovery of the stranded costs while providing a rate reduction for the company's rate payers.

- Dr. Vilbert has testified as well as assisted in the preparation of testimony and the development of estimation models in numerous cost of capital cases for natural gas pipeline, water utility and electric utility clients before the Federal Energy Regulatory Commission ("FERC") and state regulatory commissions. These have spanned standard estimation techniques (e.g., Discounted Cash Flow and Risk Positioning models). He has also developed and applied more advanced models specific to the industries or lines of business in question, e.g., based on the structure and risk characteristics of cash flows, or based on multi-factor models that better characterize regulated industries.

- Dr. Vilbert has valued several large, residual oil-fired generating stations to evaluate the possible conversion to natural gas or other fuels. In these analyses, the expected pre- and post-conversion station values were computed using a range of market electricity and fuel cost conditions.

- For a major western electric utility, Dr. Vilbert helped prepare testimony that analyzed the prudence of QF contract enforcement. The testimony demonstrated that the utility had not been compensated in its allowed cost of capital for major disallowances stemming from QF contract management.

- Dr. Vilbert analyzed the economic need for a major natural gas pipeline expansion to the Midwest. This involved evaluating forecasts of natural gas use in various regions of the United States and the effect of additional supplies on the pattern of natural gas pipeline use. The analysis was used to justify the expansion before the FERC and the National Energy Board of Canada.

- For a Public Utility Commission in the Northeast, Dr. Vilbert analyzed the auction of an electric utility's purchase power agreements to determine whether the outcome of the auction was in the ratepayers' interest. The work involved the analysis of the auction procedures as well as the benefits to ratepayers of transferring risk of the PPA payments to the buyer.

- Dr. Vilbert led a team tasked to determine whether bridge tolls were "just and reasonable" for a non-profit port authority. Determination of the cost of service for the authority required estimation of the value of the authority's assets using the trended original cost methodology as well as evaluation of the operations and maintenance budgets. Investment costs, bridge traffic information and inflation indices covering a 75 year period were utilized to estimate the value of four bridges and a passenger transit line valued in excess of $1 billion.

- Dr. Vilbert helped a recently privatized railroad in Brazil develop an estimate of its revenue requirements, including a determination of the railroad's cost of capital. He also helped evaluate alternative rate structures designed to provide economic incentives to shippers as well as to the railroad for improved service. This involved the explanation

and analysis of the contribution margin of numerous shipper products, improved cost analysis and evaluation of bottlenecks in the system.

- For a utility in the Southeast, Dr. Vilbert quantified the company's stranded costs under several legislative electric restructuring scenarios. This involved the evaluation of all of the company's fossil and nuclear generating units, its contracts with Qualifying Facilities and the prudence of those QF contracts. He provided analysis concerning the impact of securitizing the company's stranded costs as a means of reducing the cost to the ratepayers and several alternative designs for recovering stranded costs.

- For a recently privatized electric utility in Australia, Dr. Vilbert evaluated the proposed regulatory scheme of the Australian Competition and Consumer Commission for the company's electric transmission system. The evaluation highlighted the elements of the proposed regulation which would impose uncompensated asymmetric risks on the company and the need to either eliminate the asymmetry in risk or provide additional compensation so that the company could expect to earn its cost of capital.

- For an electric utility in the Southwest, Dr. Vilbert helped design and create a model to estimate the stranded costs of the company's portfolio of Qualifying Facilities and Power Purchase contracts. This exercise was complicated by the many variations in the provisions of the contracts that required modeling in order to capture the effect of changes in either the performance of the plants or in the estimated market price of electricity.

- Dr. Vilbert helped prepare the testimony responding to a FERC request for further comments on the appropriate return on equity for electric transmission facilities. In addition, Dr. Vilbert was a member of the team that made a presentation to the FERC staff on the expected risks of the unbundled electric transmission line of business.

- Dr. Vilbert and Mr. Frank C. Graves, also of The Brattle Group, prepared testimony evaluating an innovative Canadian stranded cost recovery procedure involving the auctioning of the output of the province's electric generation plants instead of the plants themselves. The evaluation required the analysis of the terms and conditions of the long-term contracts specifying the revenue requirements of the plants for their entire forecasted remaining economic life and required an estimate of the cost of capital for the plant owners under this new stranded cost recovery concept.

- Dr. Vilbert served as the neutral arbitrator for the valuation of a petroleum products tanker. The valuation required analysis of the Jones Act tanker market and the supply and demand balance of the available U.S. constructed tanker fleet.

PRESENTATIONS

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"Understanding Debt Imputation Issues," by Michael J. Vilbert, Bente Villadsen and Joseph B. Wharton, *Edison Electric Institute*, August 2007.

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Direct testimony before the Federal Energy Regulatory Commission on behalf of Mississippi River Transmission Corporation in Docket No. RP01-292-000, March 2001.

Written evidence, rebuttal, reply and further reply before the National Energy Board in the matter of an application by TransCanada PipeLines Limited for orders pursuant to Part I and Part IV of the *National Energy Board Act*, Order AO-1-RH-4-2001, May 2001, Nov. 2001, Feb. 2002.

Written evidence before the Public Utility Board on behalf of Newfoundland & Labrador Hydro - Rate Hearings, October 2001.

Direct testimony (with William Lindsay) before the Federal Energy Regulatory Commission on behalf of DTE East China, LLC in Docket No. ER02-1599-000, April 2002.

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Direct reports before the Arbitration Board for Petroleum products trade in the Arbitration of the Military Sealift Command vs. Household Commercial Financial Services, fair value of sale of the Darnell, October 2002.

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TECHNICAL APPENDIX

APPLYING THE DCF MODEL TO MLPS AT THE ENTITY LEVEL

I. INTRODUCTION

This Technical Appendix provides the details of the development of the Benchmark Model, which is used to estimate the cost of equity for the MLP as a whole. This model is intended to provide a measuring stick against which alternative models can be compared. By its design, the Benchmark model captures more carefully the nuances of the MLP's financial structure and its potential growth path. In this sense, it is expected to provide cost of equity estimates that are more reliable and consistent than many simpler models. It does so, however, at the expense of additional complexity. Of course, all models are estimates and subject to measurement error. The Benchmark Model incorporates as many aspects as is reasonably possible at present when applying DCF to a sample of MLPs.

II. MODELING ASSUMPTIONS

All models are simplifications of reality. They are so because they are designed to capture only a certain fundamental relationship underlying a phenomenon of interest. As such, assumptions must be made. The assumptions made throughout this appendix are no different than those commonly made when applying an asset pricing model – the FERC DCF model included. Specifically, the assumptions are

Assumption 1: Financial markets are reasonably efficient.

This assumption means that market prices reflect and quickly adjust to publicly available information.

Assumption 2: Financial asset prices are such that they do not allow arbitrage opportunities.

This is often described as the "no free-lunch" assumption. Prices should not allow someone to make a risk free profit through some combination of trades.

III. DECOMPOSING A MLP'S COST OF EQUITY

When assumptions 1 and 2 are met, the entire cost of equity (residual return after accounting for debt) of a MLP will satisfy:

$$k_{MLP} = \frac{V_{LP}}{V_{LP} + V_{GP}} k_{LP} + \frac{V_{GP}}{V_{LP} + V_{GP}} k_{GP} \quad (1)$$

Where k_{MLP}, k_{LP}, and k_{GP} represent the total cost of equity of the MLP, the cost of LP equity, and the cost of GP equity respectively, and similarly, V_{LP} and V_{GP} represent the market value of all LP equity and all GP equity.

Equation (1) quantifies the statement made in the main body of the report that a MLP's total cost of equity is composed of the cost of LP equity and GP equity, and that these costs should be weighted according to their relative value in the total market value of equity. It is important to recognize that this is a mathematical equality once the assumptions above have been made – there is no wiggle room for interpretation. One can argue about the assumptions, but if we are not willing to accept the basic assumptions above, then we cannot accept any DCF model – indeed, any standard pricing model – as valid. So the assumptions will be taken as given throughout the remainder of this appendix.

Equation (1) also provides a roadmap to estimating the cost of equity for a MLP – compute the total market value of each type of equity and estimate each type's cost of equity using some pricing methodology. The problem with doing this for a MLP, however, is that there is typically no direct price or analyst growth data available for the GP equity component. As such, direct estimation of the MLP's total cost of equity requires additional assumptions. However, reasonable estimates can be obtained using the fact that GP distributions are related to LP distributions by a well-defined function. The value and growth of GP equity is a derivative of LP equity for which there is market data. Assuming no arbitrage and market efficiency, one can therefore produce market-based estimates of the cost of equity for the MLP as a whole.

IV. WHY IS THE TOTAL COST OF EQUITY RELEVANT?

In computing the return on equity ("ROE") on operations by the underlying assets, the fact that a GP or LP exists is not relevant so long as the underlying operating business risk is the same. That is, if you have an otherwise identical C-corporation and a MLP, both with the same amount of debt in their capital structures, each should be given the opportunity to earn the same expected return on the same residual risk after paying the cost of debt. In an efficient market under the above assumptions, this would certainly be the case. The *Hope* and *Bluefield* standard therefore demands that the same apply to a regulated company.[1] If the cost of LP equity is lower than the overall cost of MLP equity, applying the lower cost of LP equity to the entire equity base would result in an entity organized as a MLP earning less than another entity organized as a C-corporation. This is despite the fact that both allocate identical residual risk to equity holders. In other words, the manner in which equity owners have agreed to divide the residual risk and its associated return is not relevant to determining how much expected return is fair

[1] U.S. Supreme Court's opinions in Bluefield Waterworks & Improvement Co. v. Public Service Commission, 262 U.S. 678 (1923), and Federal Power Commission v. Hope Natural Gas, 320 U.S. 591 (1944).

compensation for that same residual risk being held.[2] All companies should be given the same opportunity to earn the same return on equivalent investments whether organized as a MLP or as a C-corporation.

As discussed below, GP equity is generally riskier than LP equity. This means that the cost of GP equity is generally going to be higher than the cost of LP equity, and that the cost of LP equity will generally underestimate the true weighted-average cost of equity for the MLP as a whole. Understanding why the risk of GP is likely to exceed the risk of the LP equity requires an understanding of incentive distribution rights ("IDRs") which are characteristic of MLPs.

V. MLP INCENTIVE DISTRIBUTION RIGHTS, RISK SHARING, AND GROWTH

The relationship between LP distributions and GP distributions is governed over time by the IDR schedule of a MLP. By understanding how IDRs impact growth and the risk allocations to the GP and LP over time, one can establish a market-based estimate of the GP's equity value

A. IDRS AND THE RELATIONSHIP BETWEEN GP AND LP DISTRIBUTIONS

The IDR schedule of a MLP sets up a series of tiers and distribution sharing arrangements for any given LP distribution level ($ per unit). Specifically, each tier is defined by a range of distributions per LP unit ranges. The IDR schedule then dictates a marginal sharing rule of how additional distributions within each tier flow to the LP (and therefore to the GP). For each tier, the sharing rate dictates how much each additional dollar to the LP unit represents of the additional total MLP cash distribution per share. Although this may appear complicated, it is easier to understand through an example. Consider the following tier structure for a hypothetical master limited partnership called "MLP XYZ, L.P."

Table 1: Incentive Distribution Rights for "MLP XYZ, L.P."

		Marginal Percentage Interest in Total MLP Distributions	
	LP Quarterly Distribution	LP Unitholders	General Partner
Tier 1	up to $0.4025	98%	2%
Tier 2	above $0.4025 up to $0.4375	85%	15%
Tier 3	above $0.4375 up to $0.5250	75%	25%
Tier 4	above $0.5250	50%	50%

[2] This is also why financial leverage matters in computing a fair return on equity as defined by the Supreme Court precedents. The role of leverage is not just a theoretical notion – it is a mathematical reality of how risk and returns are divided. This is why adjustment for financial risk is warranted when trying to apply results from one group of companies to another.

Suppose the current quarterly LP distribution per unit is 43¢, so that MLP XYZ is operating in the upper end of its second tier. To calculate the total MLP distribution paid per LP unit, the amount can be broken up by tiers. First, compute the total distribution coming out of tier 1 – up to its range cap. In MLP XYZ's case, the tier 1 cap is 40.25¢, which represents 98% of the total distribution coming from this tier. Since the current LP distribution is greater than the tier 1 cap, the total distribution from tier 1 is computed at the cap:

$$\begin{aligned} 0.98 \times D_{MLP} &= D_{LP} \\ \text{or } D_{MLP} &= \frac{D_{LP}}{0.98} \\ &= \frac{40.25}{0.98} \\ &= 41.07 \end{aligned}$$

Since the additional LP distribution (43¢ – 40.25¢ = 2.75¢) flows entirely from tier 2, it therefore demands that the MLP distribute a total additional amount of:

$$\frac{2.75 \ cents}{0.85} = 3.24 \text{ cents per LP unit}$$

That is, the additional LP distribution of 2.75¢ into tier 2 represents 85% of the total MLP distribution from that tier. Together, this tells us that when MLP XYZ distributes 43¢ per LP unit, it actually distributes a total of 44.31¢ (= 41.07¢ + 3.24¢). The additional 1.31¢ per unit is the amount flowing to the GP. Note that if the LP distribution had been in the third tier instead, then the contribution from tier 2 would have been computed at the tier 2 cap (as was done for tier 1 in this example) instead, and the residual amount grossed up using the tier 3 marginal sharing rate of 75 percent.

Another way to look at how the MLP distributes cash is to look directly at the implied share of distributions flowing to each of the LP and GP holders for any given LP distribution. For example, the calculation above shows that when MLP XYZ distributes 43¢ to each LP unit, 97.04 percent of the MLP's total cash distribution (= 43¢ / 44.31¢) goes to LP equity, while 2.96 percent goes to GP equity. More generally, each MLP's IDR schedule defines an entire sharing relationship between GP and LP equity. This is conveniently quantified by the function $s(D_{LP})$, which represents the share of total distributions that flow to the GP when the LP unit distribution is D_{LP}. Total MLP distributions can then always be written as

$$D_{MLP} = \frac{D_{LP}}{1 - s(D_{LP})} \tag{2}$$

The sharing function $s(D_{LP})$ for MLP XYZ is given in Figure 1 below.

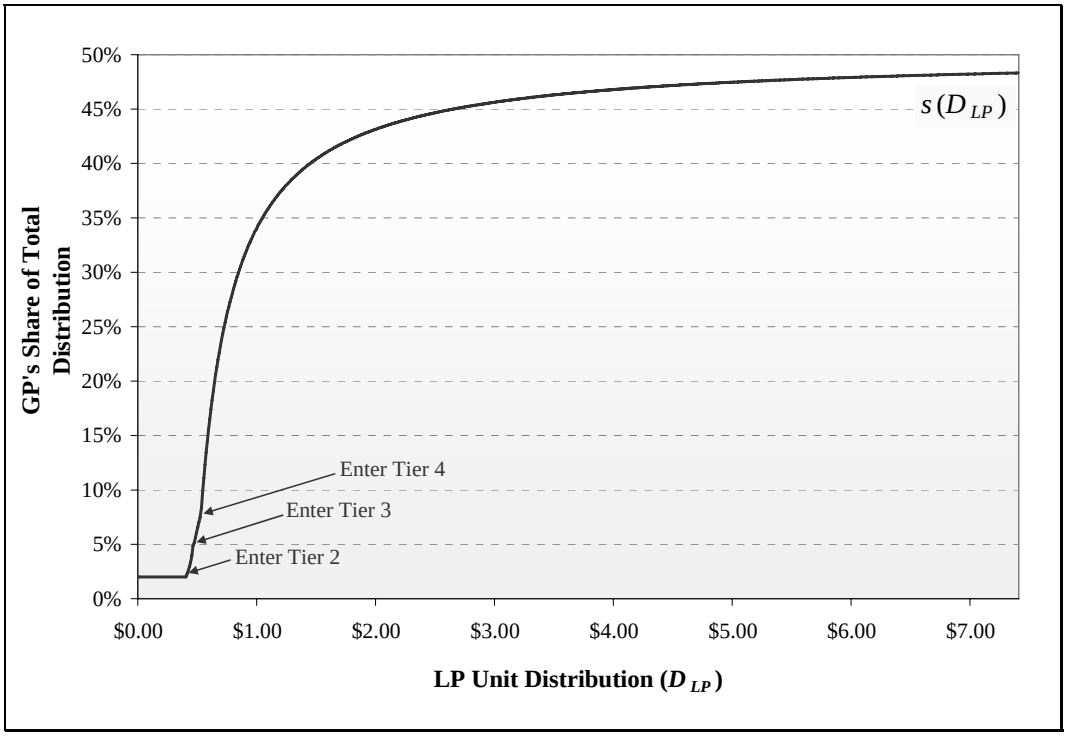

Figure 1: The sharing function $s(D_{LP})$ for MLP XYZ which graphs the proportion of total distributions going to the GP at every LP distribution level.

B. GROWTH PATHS OF LP AND GP DISTRIBUTIONS

IDRs complicate the growth paths of LP and GP distributions. For example, consider a MLP currently in its second distribution tier out of four possible tiers. Even in the situation where the overall MLP is expected to have constant, steady state growth of total distributions into the relevant future, neither the GP nor the LP will have constant distribution growth. In fact, the growth path of each is a rather complicated function for many years (see Figure 2).

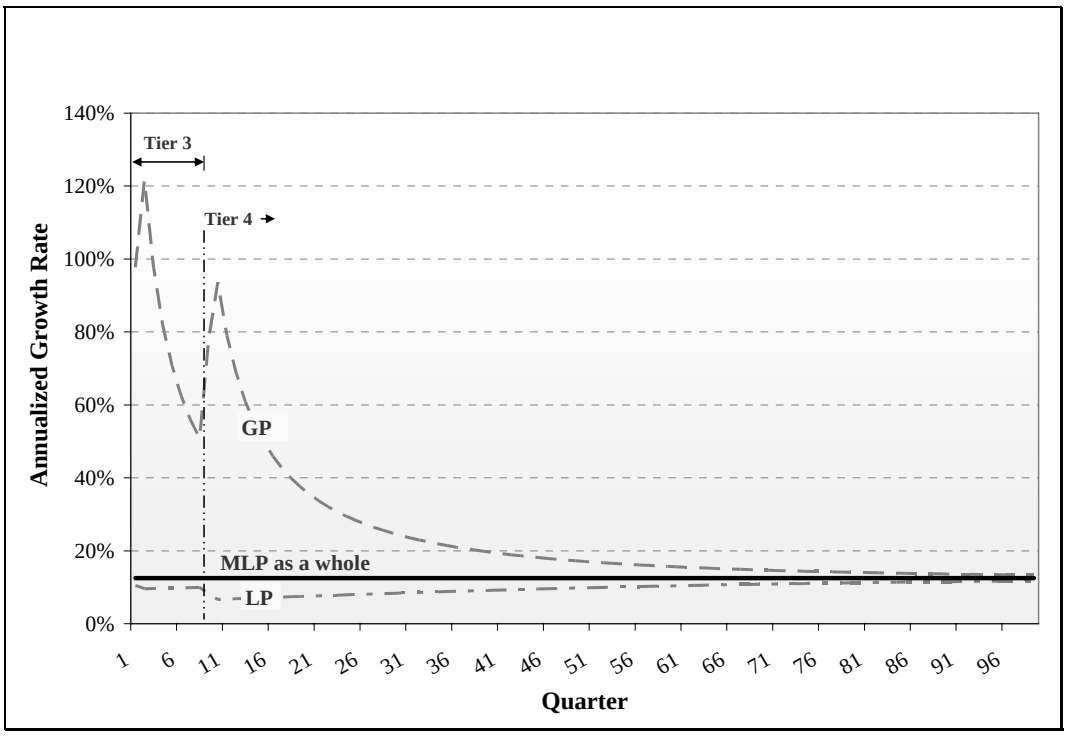

Figure 2: LP and GP Distributions Growth with Constant Entity Growth

The complications are driven by the tier structure and how it allocates much of the MLP's initial growth to the GP. As the MLP moves through the tiers, the way that growth and risks are shared between the LP and GP changes. It is interesting to note that when distributions are well into the final tier, the growth and risk allocated to the LP and GP converge. This suggests that the cost of LP and GP equity also converges over time.

VI. DCF ESTIMATION OF THE OVERALL COST OF MLP EQUITY

A. THE STANDARD DCF MODEL

The fundamental DCF model assumes that the market price of an asset equals the present value of the cash flow it generates over time, where discounting is done at a rate which reflects the cash flow's risk. This model also assumes that the present value can be calculated by the formula:[3]

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \cdots \tag{3}$$

where "*P*" is the market price of the asset; "D_t" is the distribution expected at the end of period *t* (i.e., subscript period 1, 2, 3, … in the equation); and "*k*" is the cost of capital. In words, the formula says that

[3] Sometimes referred to as the internal rate of return (IRR) formulation.

an asset's current price is equal to the sum of its expected future cash distributions, each discounted to reflect their risk and time until received.

It is often useful to re-write this formula in terms of a series of expected growth rates instead:

$$P = \frac{D_0(1+g_1)}{(1+k)} + \frac{D_1(1+g_2)}{(1+k)^2} + \frac{D_2(1+g_3)}{(1+k)^3} + \cdots \tag{4}$$

where g_t is the expected distribution growth in time *t*. This equation reinforces that when growth paths are complicated, applying DCF to estimate the cost of equity can also be complicated. If one believes that a firm is in some "steady state" for the foreseeable future, so that expected growth can reasonably be modeled as constant over time, then equation (4) reduces to a much simpler form:

$$P = \frac{D_1}{(k-g)} \tag{5}$$

where "D_1" is the dividend expected at the end of the first period, "g" is the perpetual growth rate, and "P" and "k" are the market price and the cost of capital, as before. Equation (5) is a simplified DCF model that can be solved to yield the well known "DCF formula" for the cost of capital:

$$\begin{aligned} k &= \frac{D_1}{P} + g \\ &= \frac{D_0 \times (1+g)}{P} + g \end{aligned} \tag{6}$$

where "D_0" is the current distribution, which investors expect to increase at rate g by the end of the next period, and the other symbols are defined as before. Equation (6) says that if equation (5) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future (forever constant) growth rate of dividends. I often refer to this as the simple DCF model – both because it is simple to implement and because it relies on very strong assumptions.

Figure 2 above demonstrated that even a simple growth path at the MLP level as a whole is transformed into complex growth paths for distributions at the LP and GP level. In terms of DCF estimation, these complicated initial growth paths mean that estimating the costs of equity for the individual LP and GP components will be difficult for MLPs in their lower tiers. However, since growth assumptions are easier to make and compare at the entity level, a potentially simpler approach in this situation is to apply the DCF model to the MLP as a whole.[4] For example, given constant steady state growth, the cost of capital of the MLP could be estimated as in equation (6):

[4] This also allows for a common treatment across MLPs and Corporations, which makes comparisons easier.

$$k_{MLP} = \frac{D_1^{MLP}}{P_{MLP}} + g_{MLP}$$
$$= \frac{D_0^{MLP} \times (1 + g_{MLP})}{P_{MLP}} + g_{MLP} \quad (7)$$

This gives the identical result as applying the DCF model to each equity component and recognizing each component's more complex expected growth path. The rest of this appendix focuses exclusively on how the DCF model can be applied to the MLP as a whole. Specifically, the model in mind is that from equation (4) where prices and distributions are replaced by their MLP level counterparts:

$$P_{MLP} = \frac{D_0^{MLP}\left(1 + g_1^{MLP}\right)}{(1 + k_{MLP})} + \frac{D_1^{MLP}\left(1 + g_2^{MLP}\right)}{(1 + k_{MLP})^2} + \frac{D_2^{MLP}\left(1 + g_3^{MLP}\right)}{(1 + k_{MLP})^3} + \cdots \quad (8)$$

Since growth forecasts are made at the LP unit level, we will need to derive the implied growth at the MLP level. Similarly, prices are not generally observable for GP equity, and must too be derived based on the market-based LP unit price. The following sections describe this process and the reasoning behind each step.

B. DCF Growth Path at the Entity Level

1. Terminal Growth

It is always difficult to estimate the terminal growth rate needed to implement correctly the DCF model – this is not unique to MLPs. Terminal growth assumptions are difficult to make for any organizational form, including corporations. As noted in the text of the report, for the MLP as a whole this terminal growth rate is not likely to differ from that of an otherwise identical corporation – that is, organizational structure is not likely to affect the terminal growth rate possible at the entity level. On the other hand, terminal growth in LP distributions per unit is likely to fall short of the terminal growth rate for the entity as a whole because of the way in which MLPs (and C-corporations) finance their operations. If an industry is expected to remain a constant proportion of the overall economy, the terminal growth of the entity would equal the growth rate of GDP. As noted in the report, this is a common and reasonable assumption by the FERC for natural gas pipelines organized as a C-corporation. This assumption is preserved here as well for the MLP as a whole.

2. Path of Expected Growth Until Steady State

Even after agreeing upon a terminal growth rate for use in the DCF model, the path of growth over time is an equally important component in DCF pricing and cost of equity estimation. Distributions obtained

earlier are, on a dollar for dollar basis, more valuable than those obtained later. This is a simple consequence of the time-value of money. As a result, the path of distribution growth before reaching the terminal rate can substantially affect the results of the model. A common approach taken by practitioners at the entity level is to assume that the current forecast growth rate is maintained in the short-run (five years), and then gradually trends to its terminal growth rate. It also makes more sense than suggesting that growth suddenly drops abruptly to its terminal value at some point.

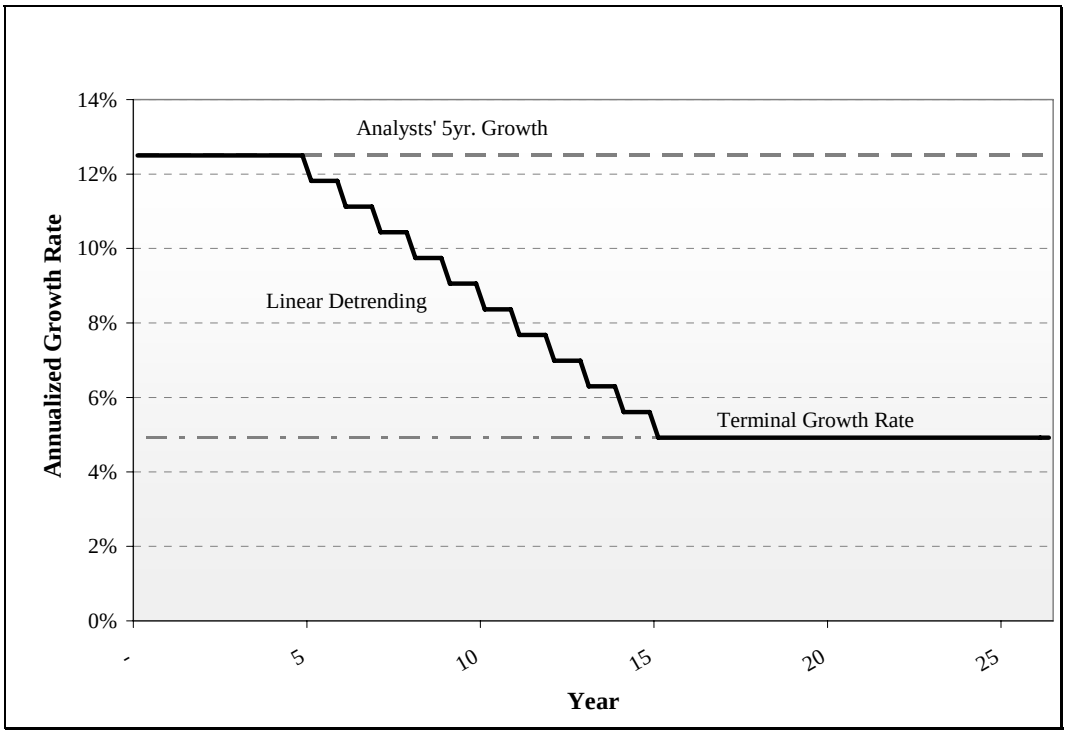

Figure 3: Linear Detrending of Multi-Stage DCF Model

In terms of specific numbers, a reasonable approach is to apply the current long-term annual forecast growth rate for the first five years, then de-trend this in a linear way to the terminal growth rate by the beginning of year sixteen. This is the approach that will be taken for the Benchmark DCF Model. The only difficulty for MLPs is that analyst growth rates are not provided at the entity level, but are forecasts for the LP units instead. As such, growth rates forecast for LP units must first be converted into growth rates for the MLP as a whole.

3. Transforming the LP Analyst Growth Forecasts into total MLP growth forecasts

A simple way to transform the LP distribution growth forecast into an entity level forecast is to back-out the total distribution growth needed to support the forecasted LP growth. Specifically, one: 1) first

computes the current total MLP distribution based on the current LP unit distribution; 2) computes the expected LP unit distribution at the end of the forecast period by applying the forecast growth rate to the current LP distribution per unit; 3) computes the future total distributions per unit implied by this forecasted LP distribution level; and 4) computes the implied growth at the entity level using these supporting MLP distributions. Annualizing this factor gives an estimate of the average annual entity level growth required to sustain the forecasted LP distribution growth. The procedure is illustrated below for MLP XYZ.

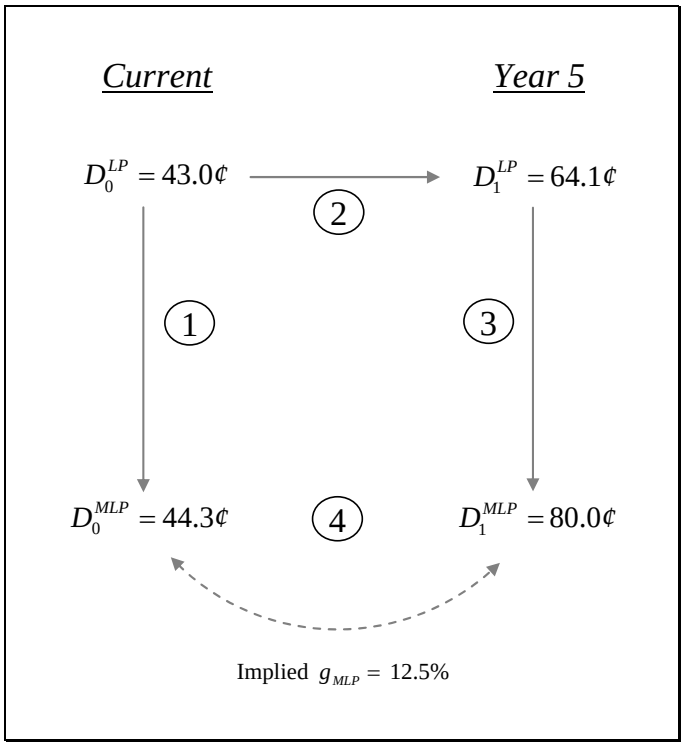

Figure 4: Transforming LP unit distribution growth forecasts into MLP growth forecasts.

Step 1. Compute the current total MLP distribution using D_{LP} and $s(D_{LP})$:

It was shown earlier that the current 43¢ LP distribution corresponds to a 44.31¢ total distribution.

$$D_0^{MLP} = \frac{D_0^{LP}}{1 - s(D_0^{LP})} = \frac{43¢}{1 - 2.96\%} = 44.31¢$$

Step 2. Derive the Forecasted LP unit distribution in five years using Analysts' five year forecasts:

In this example, MLP XYZ is forecast to have an average annual growth of 8.3 percent over the next five years. If realized, this would place LP distributions at 64.1¢ per unit by the end of year five.

$$\begin{aligned} D_1^{LP} &= (1+g_{LP})^5 \cdot D_0^{LP} \\ &= (1+8.3\%)^5 \cdot 43¢ \\ &= \ 64.1¢ \end{aligned}$$

Step 3. Compute the total MLP distribution in year 5 based on the year 5 LP distribution forecast:

To support this 64.1¢ LP distribution per unit, the MLP must flow a total of 80¢ per unit. This follows since at 64.1¢ per LP unit, the GP receives 19.9 percent of the total cash flow (based on the $s(D_{LP})$ function). Grossing up by 1/(1 - 19.9%) then gives the 80¢ amount.

$$\begin{aligned} D_1^{MLP} &= \frac{D_1^{LP}}{1-s(D_1^{LP})} \\ &= \frac{64.1¢}{1-19.9\%} \\ &= \ 80.0¢ \end{aligned}$$

Step 4. Compute the implied total MLP growth rate required to support the forecasted LP distribution growth:

In order for LP distributions to climb from 43¢ to 64.1¢ over five years, total distributions per unit must climb from 44.31¢ to 80¢. This represents an average annual MLP entity level growth of 12.5 percent over the five years.

$$\begin{aligned} g_{MLP} &= \left(\frac{D_1^{MLP}}{D_0^{MLP}} \right)^{1/5} - 1 \\ &= \left(\frac{80¢}{44.31¢} \right)^{1/5} - 1 \\ &= 12.5\% \end{aligned}$$

The 12.5 percent implied growth rate for MLP distributions is therefore a reasonable estimate of total entity level growth in the short-run.

C. THE TOTAL MARKET VALUE OF MLP EQUITY

The final component needed for the DCF model is the market value of MLP equity. While this is readily observed for LP equity using market data, it must be estimated for GP equity in general. Again, assumptions 1 and 2, together with the fact that the distributions flowing to the GP are a known function of LP distributions, provide a means to value GP equity as a function of the observable market value of LP equity. Specifically, if growth were ignored (for the moment), the relative value of LP and GP equity would be roughly the proportion of total distributions flowing to each:

$$D_{LP} = [1 - s(D_{LP})] \cdot D_{MLP}$$

$$\text{which implies} \quad V_{LP} \approx [1 - s(d_{LP})] \cdot V_{MLP}$$

$$\text{or} \qquad V_{MLP} = \frac{V_{LP}}{[1 - s(d_{LP})]} \tag{9}$$

where d_{LP} is the current LP distribution per unit. The fact that the GP is allocated proportionally more of the returns from growth, however, must be incorporated into its equity value. While IDRs allocate more growth risk to the GP, the increased expected growth makes the GP equity more valuable on net than LP equity (on a dollar for dollar basis).

Intuitively, GP equity begins as riskier than LP equity because of the fact that the distributions it receives are based upon the distribution tiers. As the MLP crosses each tier threshold, the GP receives a jump in its marginal share of total distributions, and some risk is transferred from the GP to the LP (see Figure 5 below). In other words, as the GP's share of distributions increases, the variability of its distributions decrease, reducing its risk.

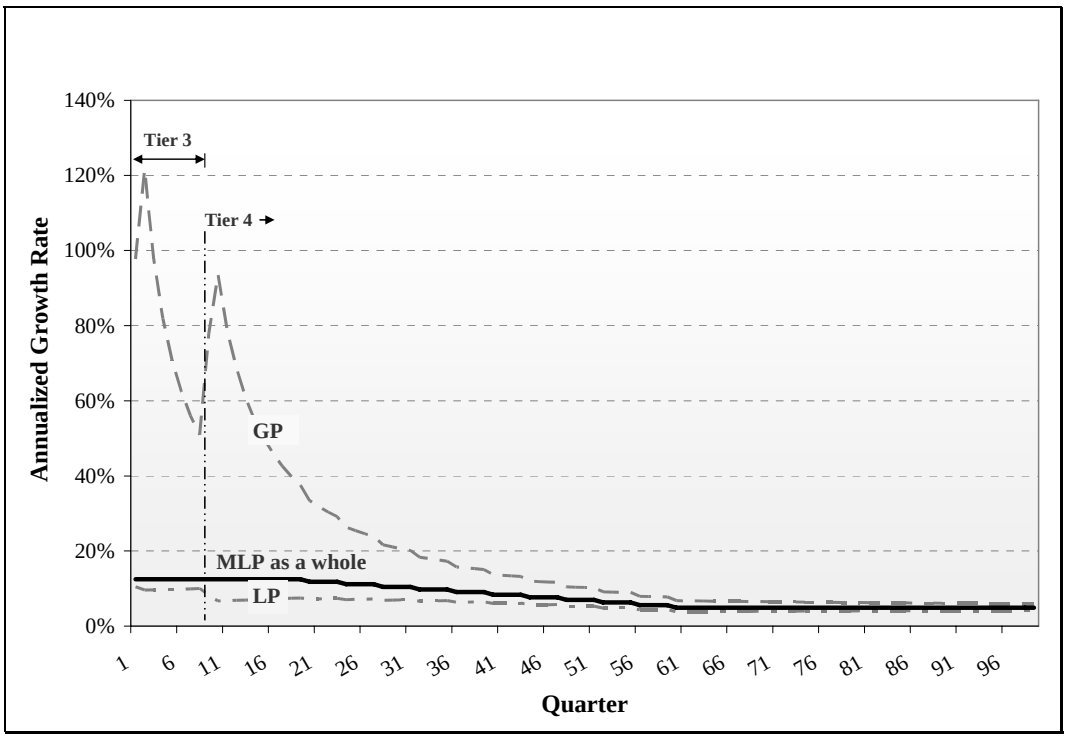

Figure 5: Multi-Stage DCF Growth Paths for GP and LP Distributions

At the same time, GP equity experiences much faster growth in distributions than LP equity because of the IDRs. These two effects (i.e., increased growth in distributions and increased risk) work against each other in terms of the market value of GP equity, but on net, the value of expected growth outweighs its added risk. As such, the proportionate market value of GP equity will be greater than its proportionate share of book equity (i.e., $(V_{GP} / V_{MLP}) > 2\%$).

How much more is a complex problem which requires advanced mathematical modeling to answer. As noted earlier, while the estimation problem is more manageable at the MLP level, one cannot escape the challenge of having to compute the market value of GP equity. What is certainly true is that the GP equity's proportionate value is no more than the upper limit of $s(D_{LP})$, which is 50 percent for MLP XYZ (see Figure 1).[5] At the same time, it is not generally going to be set by a sharing ratio less than the current sharing of $s(d_{LP})$ – that is, GP equity is generally worth at least its proportion of the current cash flow.[6] The true relative market value of GP to LP equity will typically be found at a sharing ratio somewhere in-

[5] The supremum is typically the marginal sharing rate of the top IDR tier.

[6] The exception could be if there is negative growth forecast – which would have a larger proportionate impact on GP value than LP value.

between. Although it can be pinned down precisely, a simple rule-of-thumb approach is to gross up the LP price by the midpoint of these two sharing extremes at $\bar{s}$.[7]

$$\bar{s}(d_{LP}) = \frac{s(d_{LP}) + \lim_{x \to \infty} s(x)}{2}$$

This is illustrated for MLP XYZ in the following figure.

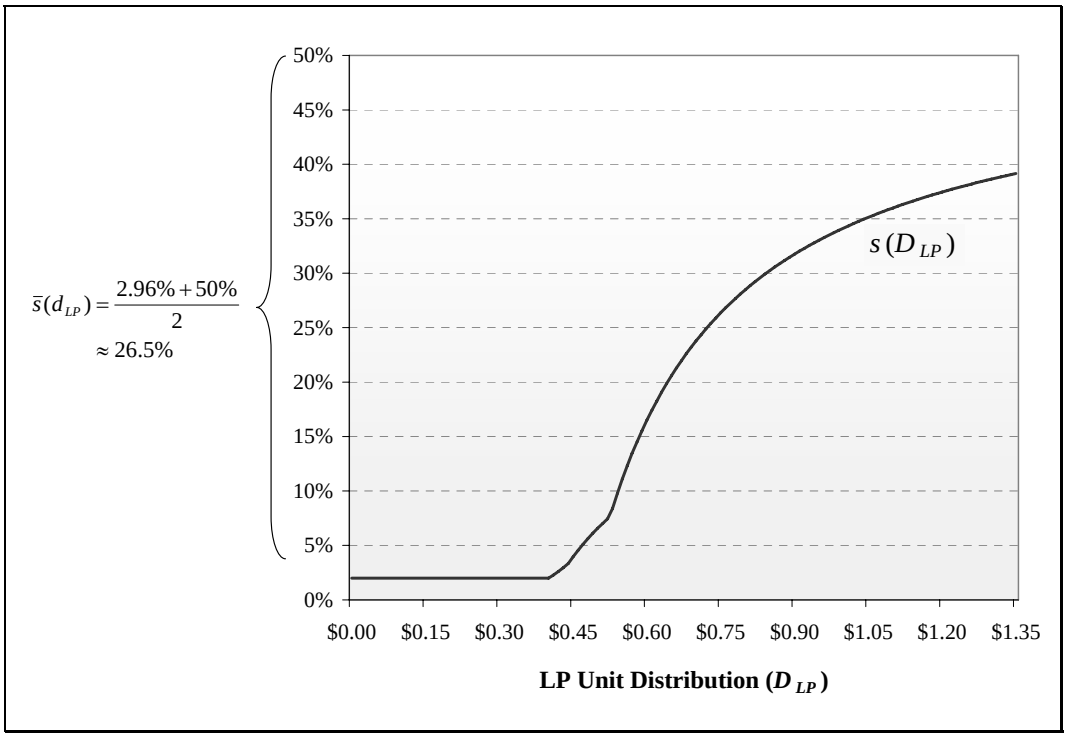

Figure 6: The rule-of-thumb adjustment used to gross up LP unit price in deriving MLP price.

If the current price of MLP XYZ's LP units is $32.95, the rule of thumb would estimate the market-based MLP price per share at:

$$\begin{aligned} P_{MLP} &= \frac{\$32.95}{1 - \bar{s}(43¢)} \\ &\approx \frac{\$32.95}{1 - 26.5\%} \\ &= \$44.83 \end{aligned}$$

The rule-of-thumb has several desirable characteristics, not the least of which is simplicity. It also generally provides for a more conservative cost of capital estimate since it has a tendency to overstate MLP entity value by a small amount. More interestingly, the rule is also self-adjusting as distributions

[7] This rule will generally overestimate MLP value, which means it generally errs by a small amount on the side of caution – overestimating MLP value will, all else equal, result in lower cost of capital estimates. An examination of market traded GP equity suggests that this is the case in general.

grow into the IDR tiers – the price gross up relative to current sharing becomes proportionately smaller as sharing approaches 50 percent. This makes sense since the benefits of additional growth become more evenly shared and reduces the additional value premium attached to GP equity. Stated another way, as sharing approaches 50 percent, the relative contribution of current distributions to the value of GP equity becomes more like that of LP equity.

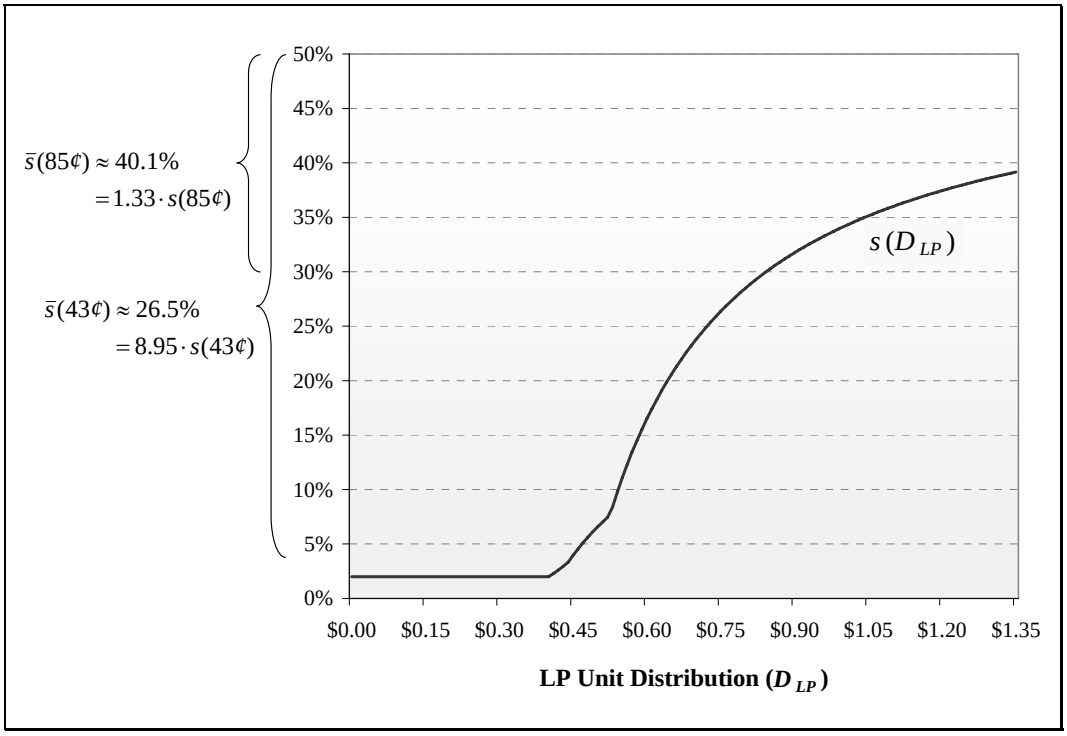

Figure 7: Self-adjustment by the rule-of-thumb.

Any reliable GP valuation must have the property that as sharing approaches 50 percent, the value of GP equity and LP equity converges to the same value – that is, GP and LP equity are valued at 50 percent of total MLP value in the limit. When $s(D_{LP})$ approaches close to 50 percent, the future cash flow per unit to the GP and LP are almost exactly the same in every state of the world.[8] As such, risk and growth become virtually the same and, by extension, value must also. Failure to do so in the limit would violate the "no free lunch" assumption.[9] The rule of thumb approximation becomes increasingly accurate as the distributions move up the tiers, and is likely to be a very good approximation once a MLP is operating within its highest tier.

[8] More precisely, the probability that they differ by a large amount becomes insignificantly small.

[9] This is a loosely stated comment that could be made rigorous in a more rigorous framework.

VII. PUTTING IT ALL TOGETHER

The DCF model estimated here is:

$$P_{MLP} = \frac{D_0^{MLP}\left(1+g_1^{MLP}\right)}{(1+k_{MLP})} + \frac{D_1^{MLP}\left(1+g_2^{MLP}\right)}{(1+k_{MLP})^2} + \frac{D_2^{MLP}\left(1+g_3^{MLP}\right)}{(1+k_{MLP})^3} + \cdots + \frac{D_{T-1}^{MLP}\left(1+g_T^{MLP}\right)+P_T^{MLP}}{(1+k_{MLP})^T} \quad (10)$$

where P_T^{MLP} is the terminal price reflecting the value, in time T dollars, of the entire future of distributions growing at the terminal rate:

$$P_T^{MLP} = \frac{D_{T+1}^{MLP}}{\left(k - g_{Terminal}^{MLP}\right)} \quad (11)$$

Below is a summary of the steps taken to estimate the Benchmark DCF Model using MLP XYZ as an example.

A. PATH OF DISTRIBUTIONS

1. Current total MLP Distribution

The current total MLP Distribution was derived from the current LP Distribution in Section V, part B-3:

$$D_0^{MLP} = 44.31¢ \quad (12)$$

2. Combining growth path with initial total Distribution

The expected total MLP Distributions for future periods are calculated by combining the current total MLP Distribution in (12) with the corresponding MLP distribution growth rates discussed in Section VI.B. Specifically, the five year growth forecast at the entity level was derived from LP distribution growth forecasts in Section VI.B.3 as:

$$g_{MLP} = 12.5\% \quad (13)$$

These are detrended as discussed earlier and Table 2 below demonstrates the resulting path of annualized growth rates for MLP XYZ distributions, along with the actual distributions themselves. The table shows the annualized growth rates from Quarter 1 to Quarter 20 remain unchanged. From Quarter 21 these rates start varying as the linear trend to the terminal GDP growth rate period begins. From Quarter 60 onward, the rate is constant as MLP XYZ reaches steady state.

Table 2: Excel snapshot of calculations used to derive the implied total distribution path and to solve for the implied cost of equity.

Distribution Stream for "MLP XYZ"

Quarter		Total Distribution	Annualized Growth Rate of MLP Distributions	
Current Price / unit	*$*	*44.83*		
Current Total MLP Distribution	*$*	*0.4431*		
1	$	0.46	12.5%	
2	$	0.47	12.5%	
3	$	0.48	12.5%	LT Analyst Forecast
.		.	.	
.		.	.	
.		.	.	
20	$	0.80	12.5%	
21	$	0.82	11.8%	
22	$	0.85	11.8%	
23	$	0.87	11.8%	
24	$	0.89	11.8%	
25	$	0.92	11.1%	
26	$	0.94	11.1%	
27	$	0.97	11.1%	Linear Detrending Period
28	$	0.99	11.1%	
29	$	1.02	10.5%	
30	$	1.04	10.5%	
.		.	.	
.		.	.	
.		.	.	
59	$	1.82	5.6%	
60	$	1.84	4.9%	
61	$	1.87	4.9%	
62	$	1.89	4.9%	
63	$	1.91	4.9%	Terminal Growth
64	$	1.93	4.9%	
65	$	1.96	4.9%	

Year 60 Price / unit	$112.28	
Trial COE: Quarterly Rate*	2.91%	[a]
Annualized COE: Annual Rate	12.16%	[b]
Cost of Equity	12.16%	[c]
(Annualized COE - COE) x 100	0.00	[d]

Notes:
[a]: Quarterly rate of return.
[b]: ((1 + [a]) ^ 4) - 1.
[c]: ((1 + IRR) ^ 4) - 1.
[d]: [b] - [c].
* Solved using Goal Seek function.
- Set [d] equal to zero by changing [a].

The paths of LP, GP, and total distributions are graphed in Figure 8 below.

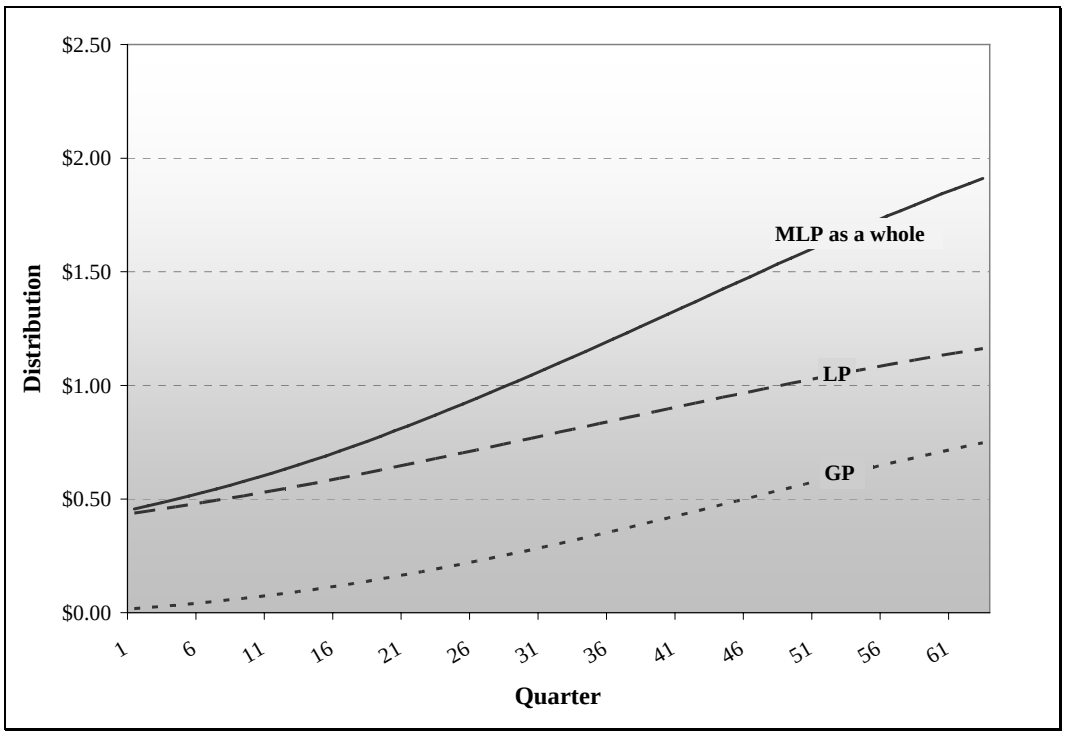

Figure 8: Paths of distributions implied by the forecasted growth paths for MLP XYZ.

3. Entity Level MLP Price

The current entity level MLP price is derived from the current LP price in Section VI.C above:

$$P_{MLP} = \$44.83 \tag{14}$$

4. Computing the Implied Cost of Equity

The implied cost of equity in equation (8) is estimated using the Goal Seek function in Excel:

$$\hat{k}_{MLP} = 12.16\% \tag{15}$$

VIII. FINAL COMMENTS

The model developed in this appendix is a simplification of reality, but one which attempts to provide a balance between ease of implementation and additional complexity in the DCF framework. As was stated at the outset, it captures many aspects of the MLP structure which make it a more accurate representation of the MLP's financial and growth characteristics. Notwithstanding its apparent complexity, there are elements which could be modeled more precisely and which, with further research, might yield even

better approximations. As mentioned above, a more precise modeling of the way risk is divided between the LP and GP over time would provide a more precise mapping of LP to MLP value. Moreover, additional research and precise modeling of how MLP's finance growth could lead to more accurate terminal growth rate forecasts and the time path of the growth estimates. These components of the DCF model continue to be difficult to estimate for both MLPs and C-corporations. Given our current understanding, however, I believe this model to be the most reasonable way of applying DCF to a sample of MLP companies.