Evaluation of Changes in the BSM Rules on Financial Risk

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Introduction

- Out-of-market investment can undermine the market's ability to attract investment needed for resource adequacy.
  - ✓ BSM tends to limit the price effects of out-of-market entry.
- However, the status quo BSM rules could become a barrier to or increase the costs of NY State achieving its public policy goals.
- The NYISO is considering reforms to sustain the competitive performance of the market if BSM is largely eliminated.
  - ✓ Eliminating BSM for most resources will affect the long-term investment and retirement decisions of participants by increasing the volatility and risk associated with future revenues.
  - ✓ We have evaluated this risk and how it can be accounted for in the market.

Introduction

- This presentation provides our conceptual framework for evaluating these risks. It is divided into the following sections:
  - ✓ Key drivers of financial risk for investors in capacity resources
  - ✓ Overview of our approach to modeling financial risk
  - ✓ Principles for determining model inputs
  - ✓ Illustrative results

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Drivers of Financial Risk for Investors

Principles of Capacity Market Design

- The capacity market is designed to provide efficient incentives for the investment needed to satisfy resource adequacy needs.
  - ✓ In a market with resource adequacy targets, E&AS markets do not provide adequate revenues to sustain reserve margins at the targeted level.
  - ✓ This revenue shortfall is called the "missing money" which the capacity market is designed to provide.
- Investment in long-lived (i.e., >20-year) assets depends on long-term expectations
  - ✓ Spot capacity auctions provide very limited revenue certainty
  - ✓ Expectations regarding auction clearing prices drive long-term revenue expectations
  - ✓ Revenue uncertainty drives many firms to enter into hedges

Principles of Capacity Market Design

- Capacity prices are determined using sloped demand curves:
  - ✓ Leading prices to rise when entry would be economic
  - ✓ Leading prices to fall as the capacity surplus rises
  - ✓ Promoting price stability
  - ✓ Reflecting the approximate reliability value of capacity
- The height of the sloped demand curve depends on the Net CONE ("Cost of New Entry") of a generic potential new entrant (i.e., the demand curve unit)
  - ✓ The height is set in order to motivate investment needed to achieve a target level of reliability – the investor must expect to recover CONE over the long run as prices fluctuate.
  - ✓ Rising risk associated with future price volatility will raise the CONE for new resources.

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Estimation of WACC in Demand Curve Reset

- Key considerations for the evaluation of the Net CONE:
  - ✓ Estimation of E&AS revenue
  - ✓ Long-term capital investment cost depends on:
    - Amortization schedule of the investment
    - The return on equity ("ROE"), cost of debt, and capital structure determine the Weighted Average Cost of Capital ("WACC")
- Investment risk affects the WACC in two ways. Higher market risk will:
  - ✓ Result in higher required ROEs for the portion of the investment that is equity financed.
  - ✓ Raise the cost of debt as the probability of receiving sufficient revenue to cover debt service falls.

Market Risk without Out of Market Entry

- In a market where new investment is motivated by price signals:
  - ✓ Gradual demand growth and attrition of older inefficient supply:
    - – Leads to gradual new entry and low price-volatility
  - ✓ New supply investment is often lumpy:
    - – Leads to some transitory periods of lower prices, which investors expect.
  - ✓ Ultimately, market responses dampen the effects of shocks.
- Long-term revenue forecasts reflect moderate uncertainty if future entry decisions are assumed to primarily be driven by the expected market prices.
  - ✓ Large sustained surpluses are much less likely when investment and retirement decisions are governed by the market alone.

Market Risk with Out of Market Entry

- In a market with substantial out-of-market entry and exit:
  - ✓ Policies may lead to large shocks in supply and demand such as:
    - Subsidized investment when prices are low,
    - Electrification of heating and EV sectors,
    - Environmental restrictions that lead to retirement,
  - ✓ Investment and retirement responses to these shocks can take years to materialize, increasing price effects in the short to medium term
    - Such responses also depend on long-term expectations.
  - ✓ BSM tends to moderate the resulting price effects of out-of-market entry and exit.

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Conclusions Regarding Investment Risk

- The sloped shape of the demand curve promotes price stability by increasing price as surplus falls and vice versa.
  - ✓ The height of the demand curve is set to motivate investment to satisfy reliability needs over the long-term
- Investors that rely on wholesale market revenues respond to S&D shocks in a manner that dampens their effects.
  - ✓ High levels of investment that disregards wholesale prices may exhaust the capability of the market to respond to shocks.
  - ✓ Policy-driven investment tends to increase shocks.
  - ✓ The status quo BSM rules reduce the resulting price effects.
    - Elimination of BSM will tend to increase investment risks
- We have developed an approach to analyzing the effect of BSM elimination on risk. This is discussed further in the next section.

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Modeling Framework

Estimation of WACC in Demand Curve Resets

- The investment effects of risk and uncertainty is primarily accounted for in the WACC used to calculate Net CONE.
- Recent DCR studies have estimated the WACC based on:
  - ✓ Financial market theory including the capital asset pricing model
  - ✓ Publicly traded independent power producers and utilities
    - – These firms are primarily exposed to market risk in regions with a MOPR or limited state policy intervention
- Our model is designed to estimate how future price and revenue volatility would be affected by *a change* in market rules. We will then use these results to estimate:
  1) The effect of these changes on the ROE using the capital asset pricing model; and
  2) The effects on investors' cost of debt based on the processes employed by the ratings agencies.

Modeling Framework – Overview

- Like a typical DCR study, we are modeling a wholesale power market under the long-term equilibrium condition:
  - ✓ Net CONE = E(capacity prices over the life of the investment)
    - – Net CONE depends on WACC
    - – Increased volatility increases WACC
    - – Thus, increased investment risk requires higher expected price levels to motivate investment
- DCR studies base capital cost assumptions on a review of historic data for comparable publicly-traded firms.
  - ✓ There are no historic comparables for a competitive power market that motivates merchant new entry without a MOPR amid high levels of policy-driven investment
  - ✓ Hence, a different approach is needed for this evaluation

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Modeling Framework – Overview

- The approach is to explicitly model a system under long-term equilibrium conditions with uncertainty.
  - ✓ We will evaluate how uncertainty drives price volatility, leading investment risk to differ in the following two cases:
    - Case 1: Under the status quo BSM rules
    - Case 2: After change in BSM rules
- Explicitly model significant market features including:
  - ✓ Aspects of existing supply & demand that provide price elasticity
  - ✓ A power system in transition due to policies to invest in clean generation and to shift consumers away from fossil fuel use
  - ✓ Use Monte Carlo techniques to evaluate the price effects from uncertainty regarding state policies and other market factors.

Price Volatility and Cost of Equity

Capacity Price formation depends on:

- ✓ Elasticity of existing supply and demand
  - e.g., net GFCs, environmental permit restrictions, projected demand growth
- ✓ Elasticity of potential new merchant supply
  - e.g., net CONE, environmental permitting & siting
- ✓ Elasticity and quantity from demand-side policies
  - e.g., heating and transportation electrification, time of use rates, energy efficiency, BTM generation and storage
- ✓ Elasticity and quantity of policy-driven generation investment
  - e.g., land-based wind, solar, offshore wind, Canadian hydro, battery storage
  - BSM potentially alters the price effects from these investments

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Price Volatility and Cost of Equity

- The Capital Asset Pricing Model predicts that increasing expected volatility of market revenues will increase the cost of equity:
  - ✓ $COE_{NoBSM} = COE_{BSM} \times StDev_{NoBSM} \div StDev_{BSM}$ where
    - – COE_{BSM} is the power market risk component of cost of equity under BSM, which we derive from the DCR study and recent orders setting regulated ROEs:

      COE_{BSM} = {Merchant cost of equity} minus {Regulated cost of equity}

    - – *StDev* is the expected standard deviation of market returns in each case
- Hence, one of the primary results of the model will be the estimated difference in the standard deviation of market revenues in the BSM and NoBSM cases.

Cost of Debt and Capital Structure

- In the DCR study, cost of debt is estimated from:
  - ✓ Yields on recent debt instruments for IPPs
- If BSM is largely eliminated, the cost of debt may rise if there is a significant change in expected market risk
  - ✓ Cost of debt can be estimated from the "NoBSM" case and how guidance from debt rating agencies would be applied to it.
  - ✓ Increased price volatility increases the cost of debt
    - – Debt ratings focus on the low end of the potential range of market revenues, which would fall if price volatility increases.
    - – Hence, the low end of the distribution of market revenues is most relevant for the cost of debt.
  - ✓ This guidance can also be used to assess whether the efficient capital structure will change if price volatility increases.

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Putting the Model Together

- For a given set of inputs and scenarios, our model assumes the following equilibrium condition across scenarios for Case X:
  - ✓ $CONE_x(WACC_x(Revenue_x)) = E(Revenue_x)$
- In Case 1, we model system w/status quo BSM at equilibrium:
  - ✓ Assume $CONE_1$ and $WACC_1$ from DCR study
- In Case 2, we model system w/BSM eliminated at equilibrium:
  - ✓ $CONE_2(WACC_2(Revenue_2)) = E(Revenue_2)$ using identical scenarios and other inputs related to supply and demand
  - ✓ Where $WACC_2$ is a function of COE_2, COD_2, and D/E ratio
  - ✓ $COE_2 = COE_1 \times StDev_2(Revenue_2) \div StDev_1(Revenue_1)$
  - ✓ COD_2 is determined based on how the distribution of returns in Case 2 relative to Case 1 would affect rating agency guidance and capital structure adjustment

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Principles for Determining Model Inputs

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- New York is transitioning from a conventional fleet to one with high penetration of clean resources driven by state policies.
- Detailed information is available about clean energy policies. However:
  - ✓ There is substantial uncertainty regarding the timing and quantities of new supply over the investment time horizon
  - ✓ Some policies allow flexibility
    - – For example, it may be unclear whether the policy will focus on solar or wind to achieve certain targets
  - ✓ Individual clean projects may experience significant delays
    - – For example, a project originally contracted to enter in 2024 might not enter the market until 2028
  - ✓ Policies may continue to evolve after 2021

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Principles for Determining Model Inputs

- The approach assesses how the current WACC would be affected by a change in the BSM rules:
  - ✓ A range of scenarios is modeled to capture the effects of uncertainty on investment risk
    - – The same scenarios are examined in Case 1 and Case 2, so over- or under-estimates of uncertainty should not significantly affect the estimate of how a change in rules would affect the WACC
  - ✓ A stylized model captures a group of years in a single clearing of supply and demand. (The additional complexity of a multi-period model would likely not change the results significantly.)
- Our assumptions are based on expected policies and conditions around 2030, representing the medium term as a proxy for uncertainty over the investment horizon.

Illustrative Results

Illustrative Results – Revenue Distribution with and without MOPR

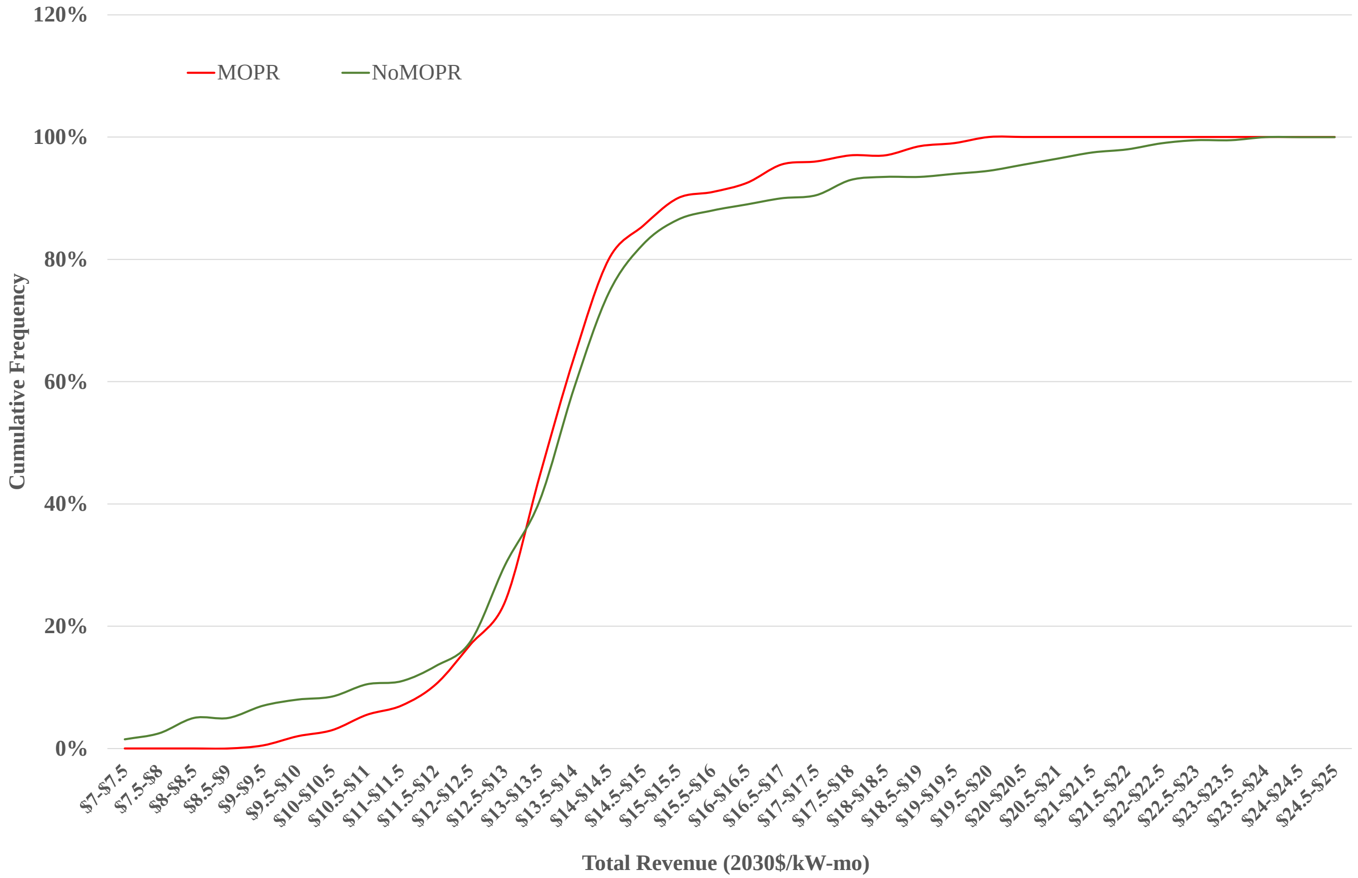

Figure shows distribution in No MOPR case before adjusting COE, COD and debt ratio.

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Illustrative Results – Assessment of COD

2030$/kW-mo	Notes	Base	Rating Case	
			MOPR	No MOPR
Total Revenues	[1]	$ 13.7	$ 10.6	$ 9.6
Fixed costs	[2]	$ 5.3	$ 6.0	$ 6.0
Taxes	[3]	$ 1.0	$ -	$ -
Net Cash Flow	[4] = [1] - [2] - [3]	$ 7.4	$ 4.6	$ 3.6
Debt Service	[5]	$ 3.3	$ 3.3	$ 3.3
DSCR	[4]/[5]	2.25	1.41	1.10

[1] Includes Capacity, PFP, scarcity and EAS revenues. All revenues derated by 6% to account for lower availability and EAS revenues derated by 2.5% to account for higher heat rate

[2] Fixed O&M in No MOPR case increased by 12% per guidance from S&P and Fitch (relative to base case) to reflect performance stress

[3] Federal and State income taxes

- Based on the Rating Case DSCR (1.10), we estimate a COD in No MOPR case = 8.1% for a 55/45 debt-equity ratio before modifying supply and demand to reflect higher COE and COD.

Illustrative Results – Assessment of COE and Calculation of WACC

- Estimated increase in COE in No MOPR case

  $= (Std\ Dev(Rev_{NoMOPR}) / Std\ Dev(Rev_{MOPR}) - 1) \times (Power\ Market\ Premium)$

  = (2.64/1.74-1) x 3%

  = 1.54%

  ✓ Hence, the estimated COE in No MOPR case (before modifying supply and demand to reflect higher COE and COD) = 14.54%

- Increasing COE and COD shifts the demand curve and supply offers from new resources. Iterating to determine the COE and COD produces the following results (see slide 36):

  ✓ COE = 15.36%

  ✓ COD = 9.03%

  ✓ ATWACC = 10.54%

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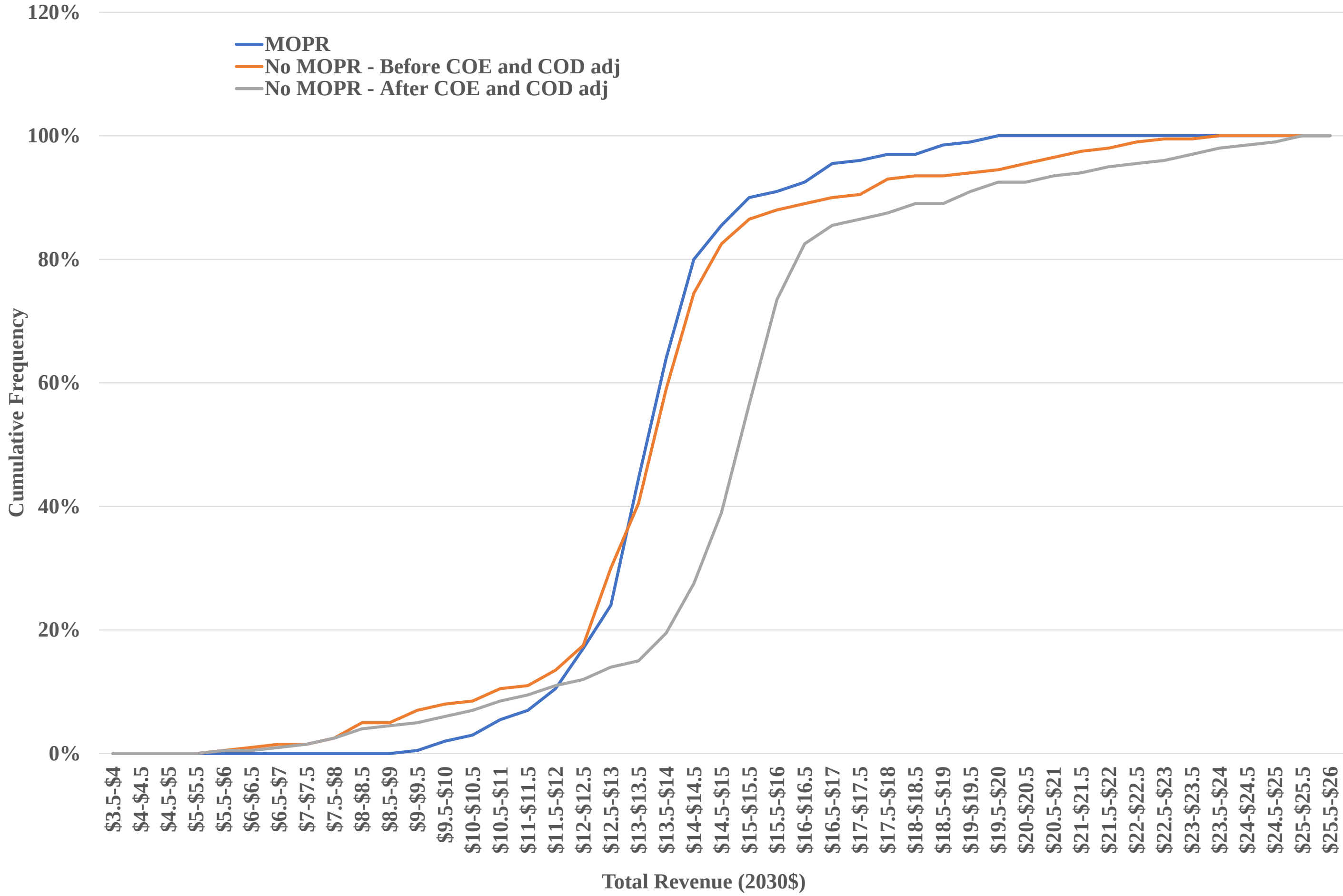
Illustrative Results – Revenue Distribution in No MOPR Case after COE and COD Adjustment



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Adjusting Debt Ratio

- We evaluate if a developer would reduce the debt ratio to lower the overall cost of capital in the No MOPR case.
  - ✓ This reflects the ability of developers to adjust their capital structure to reduce the cost of capital.
- A lower debt ratio would have the following effects:
  - ✓ Reduce the required debt service payments, improving its DSCR and debt rating (thus lowering the WACC).
  - ✓ Increase the weight of the COE in calculating the WACC (thus increasing the WACC).
  - ✓ Reduce the COE (thus lowering the WACC) because the volatility project revenues falls in proportion to the amount of equity.
  - ✓ Increase the COE (thus increasing the WACC) because some default risk shifts to equity holders at lower leverage levels.

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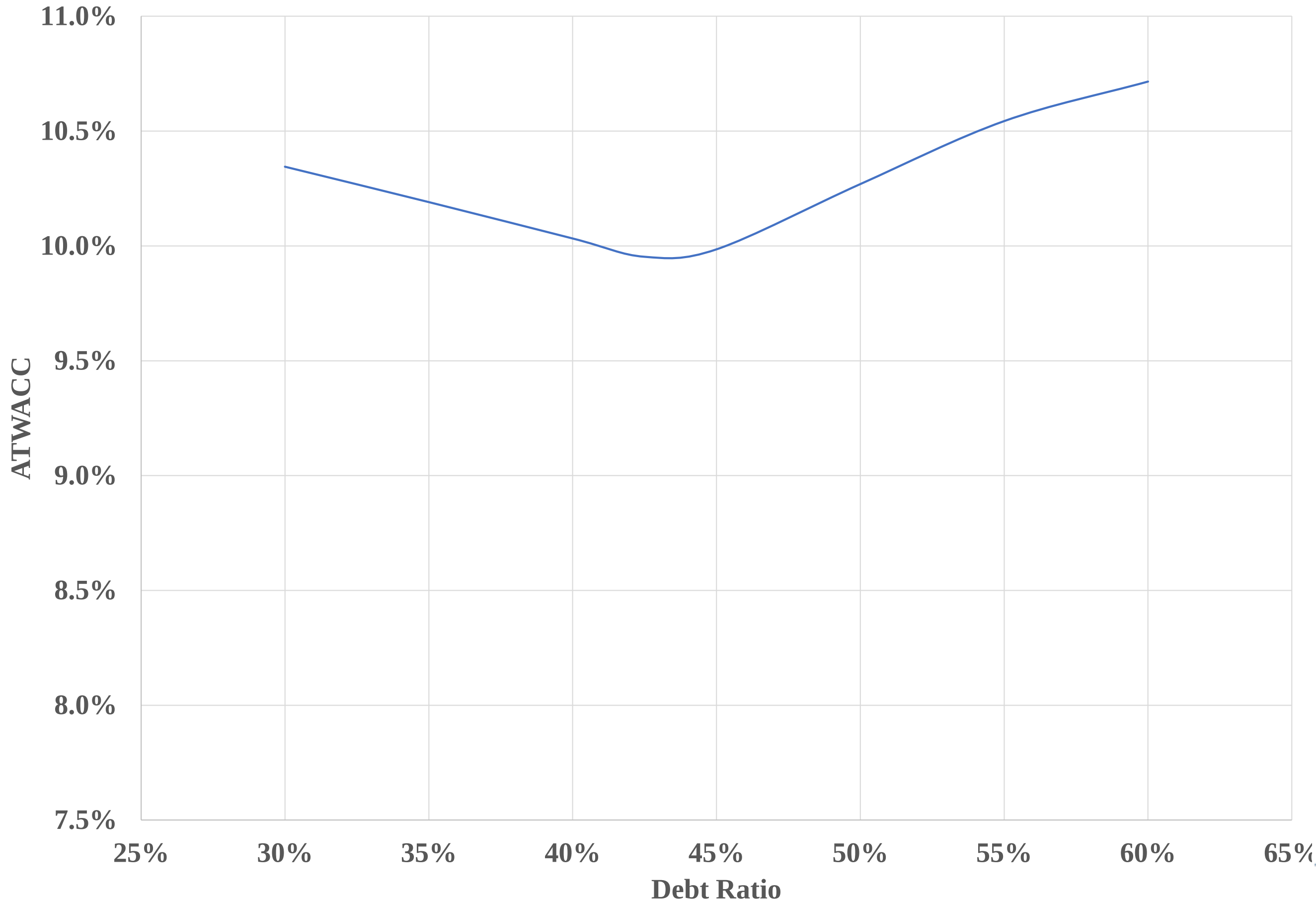
Adjusting Debt Ratio – Illustrative Results

- Example where optimal debt ratio is 42.5%.



Appendix

Bond Yields

- The following table shows the assumed corporate bond yields for B and BB-rated bonds

Rating	Yield
BB	5.06%
BB-	5.68%
B+	6.45%
B	7.26%
B-	8.34%

- The yields shown are derived from:
  - ✓ Corporate BB and B index yields for the January-June 2020, published by FRED (Federal Reserve St. Louis)
  - ✓ Spread for each rating from January 2021 published by Professor Damodaran of Stern School of Business[8]

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Impact of Leverage on Cost of Equity

- Leverage increases the financial risk to equity holders and thus increases the required COE. In general:

  Return to equity = (Free Cash Flow – Debt payment)/ Equity Value

- Hence, if risk to equity holders is measured by the volatility in the return to equity, it increases as the equity value decreases.
- We utilized the Extended Hamada equation (also referred to as Conine equation) to adjust the cost of equity for leverage (see next slide)
- Our choice of the Extended Hamada (over the Hamada equation) was driven by the significant spread between merchant COD values and the risk-free rate.

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Extended Hamada Equation

$$\beta_L = \beta_U \text{ x } (1 + (1\text{-}T) * (D/E)) - \beta_D \text{ x } (1\text{-}T) \text{ x } (D/E)$$

Where:

β_L – levered equity β

β_U – unlevered equity β

β_D – β of debt

T – tax rate

D/E – debt-to-equity ratio

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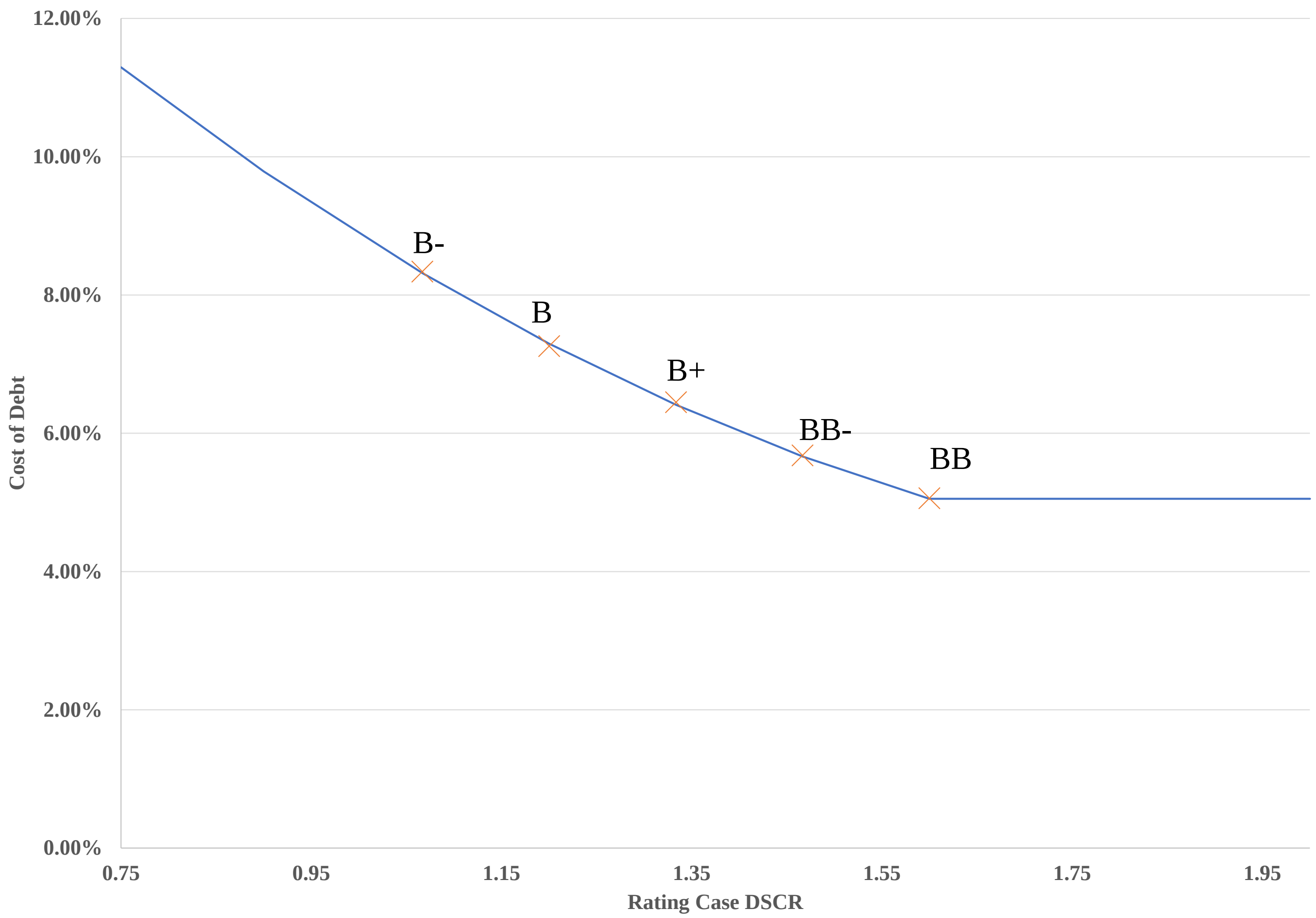
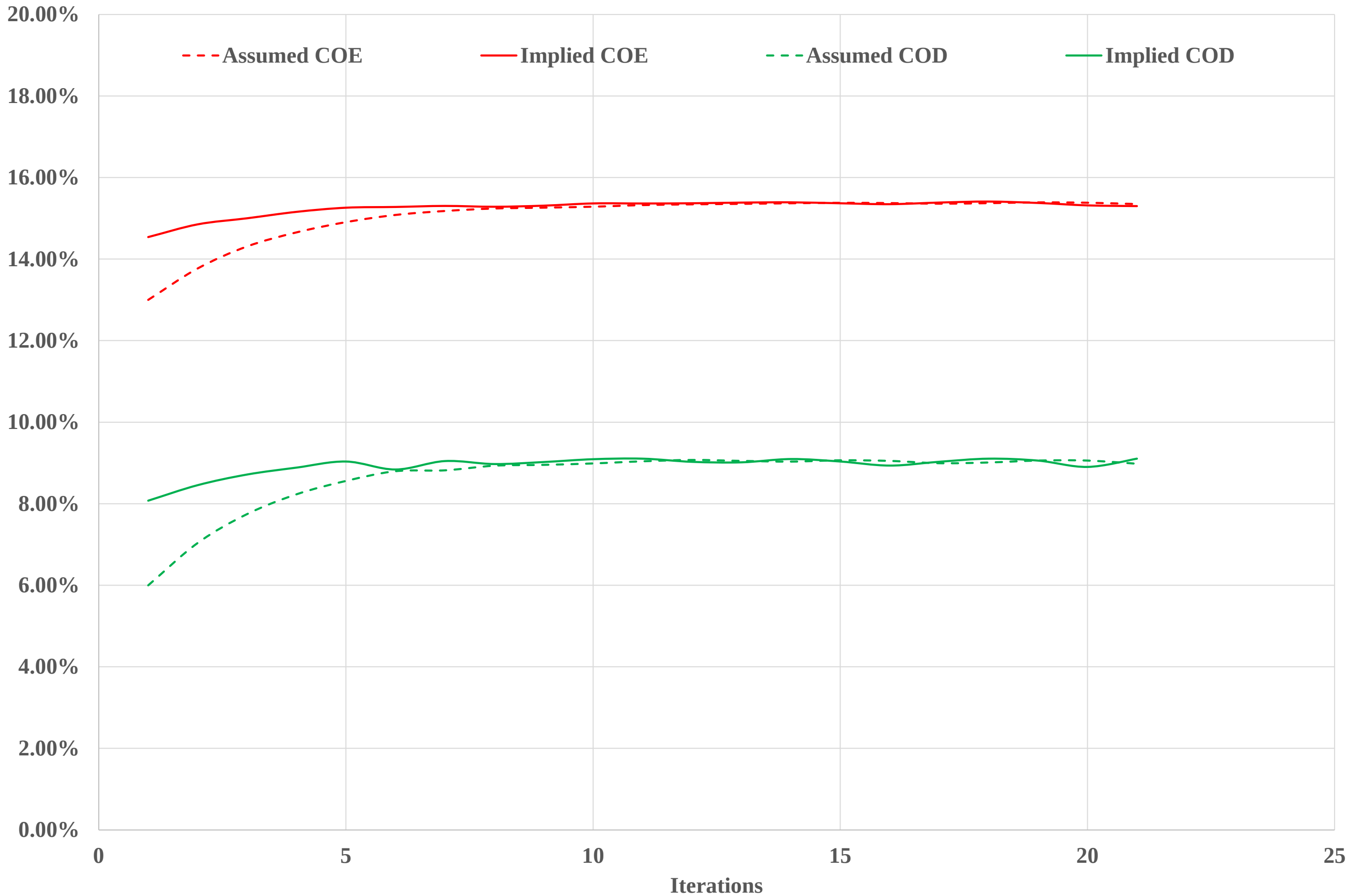
Assumed Relationship between COD and DSCR



Iterations to determine COE and COD in No MOPR Case (no leverage adjustment)



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