Possible Financial Strength Measures for
Offshore Platforms South of the 68th Parallel

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Summary

This paper discusses methods meant to address the State's exposure to the potential financial costs associated with a lessee failing to complete its DR&R obligations for offshore platforms south of the 68th parallel. The financial metrics discussed would be used to quantify an organization's DR&R default risk to the State. A possible bonding matrix meant to quantify an organization's DR&R default risk is discussed. The combination of a company's Z-score and Value of Equity will determine its position in the bonding matrix.

Background

The State of Alaska's mineral estate is vast. The funds derived from the monetization of this estate provide the fuel that supports the budget of the State of Alaska, high-paying jobs for Alaskans, and large benefits for the private sector economy of Alaska. One essential element in transforming the State's mineral estate from resource to revenue is the installation of infrastructure, like offshore platforms, to facilitate field operations. While the installation of offshore platforms may be necessary for the monetization of the State's mineral estate, particularly south of the 68th parallel, it is not a risk-free endeavor.

One risk associated with infrastructure installation is the so-called 'abandonment' risk. When an offshore platform is installed on State land, the entities currently leasing the land on which the platform is installed incur a contractual obligation to remove the infrastructure and return State land to a condition acceptable to the State; this process is commonly referred to in the oil and gas industry as dismantlement, removal, and restoration (DR&R). For a variety of potential reasons, a lessee may fail to fulfill its DR&R obligation. If the State is unable to recover damages from the lessee for failure to DR&R, the State may need to expend State funds to remove the platform and associated infrastructure and return its lands to the desired condition.

Management of Risk for Dismantlement, Removal, and Restoration

The State of Alaska, through the Department of Natural Resources' Division of Oil and Gas, is currently developing methods meant to address the State's exposure to the potential financial costs associated with a lessee failing to complete its DR&R obligations for offshore platforms south of the 68th parallel. The ultimate objective is the development of an empirical financial strength test to periodically assess a lessee's capacity to carry its DR&R obligations, and by extension, to insulate the State against the financial risk associated with platform abandonment. An empirical financial strength test would protect the interests of Alaskans, be administered rapidly, and rely on well-known financial measures shown in the literature to be predictive of the sort of risk faced by the State.

More than merely an academic discussion, two recent examples, one in Alaska, both in the United States, serve as cautionary tales. On March 9, 2009, a small independent oil and gas company, Pacific Energy Resources Ltd., filed for bankruptcy. One key asset in Pacific Energy Resources Ltd.'s portfolio was the Osprey platform located in Alaska's Cook Inlet. Although a new operator was ultimately secured to resume operations on the platform, had such an operator been unavailable, the State faced the very real specter of expending tens of millions of dollars in State funds to conduct DR&R operations for the Osprey platform. Much like Pacific Energy Resources Ltd., in 2012ATP Oil & Gas Corporation also filed for bankruptcy protection in. In its asset portfolio, ATP possessed an offshore platform in its Gomez Field located in the United States Gulf of Mexico. Resulting from this bankruptcy, ATP "walk[ed] away from an oil-drilling platform in the Gulf of Mexico, leaving it unmanned and a threat to public safety at the start of hurricane season."[1] The federal government negotiated a deal with ATP to make the estimated $153 million cost to DR&R ATP's abandoned platform a top-priority expense in the bankruptcy case, but it is currently unclear whether there will be funds to cover this expense or whether the federal government will pursue legal action against other parties.

General Framework of a Financial Test

The method being considered by the Division of Oil and Gas is informed by the approach taken by the United States Department of the Interior's Bureau of Ocean Energy Management (BOEM) as well as past work conducted by the Division of Oil and Gas. BOEM's supplemental bonding scheme requires full bonding (or indemnity) for companies that do not pass a financial

[1] www.rigzone.com/news/oil_gas/a/127079/Struggling_for_Cash_ATP_Abandons_Gomez_Oil_Drilling_Field.

strength test; no bonding is required for companies that pass the financial strength test (or are indemnified by a firm that passes the financial strength test). BOEM's supplemental bonding scheme considers three metrics to determine financial strength: a lessee's net worth, debt-to-equity, and the percentage of net worth represented by estimated DR&R costs. As shown in Table 1, BOEM sets minimum levels for each of these financial metrics in order to demonstrate financial strength.

Table 1. BOEM Financial Strength Requirements

For Lessees with stockholders' equity or net worth of:	If the lessee's cumulative potential decommissioning liability is equal to or less than 25% of stockholders' equity or net worth, the lessee's debt-to-equity ratio (total liabilities/net worth) must be:	If the lessee's cumulative potential decommissioning liability is greater than 25% but equal to or less than 50% of stockholders' equity or net worth, the lessee's debt-to-equity ratio (total liabilities/net worth) must be:
$65 million to $100 million	Equal to or less than 2.5	Equal to or less than 2.0
Greater than $100 million	Equal to or less than 3.0	Equal to or less than 2.5

Source: NTL No. 2008-N07, p. 4.

The Division of Oil and Gas is considering a more gradated approach to DR&R security that recognizes that an incremental approach may better serve the State's dual interests of maximizing development while also ensuring that its lands are maintained in a fashion that allows for their perpetual use and enjoyment by all Alaskans. Fundamentally, the central issue under study can be framed as an examination of the expected loss to the State stemming from lessees failing to satisfy the DR&R obligations that exist for offshore platforms south of the 68th parallel. For a given platform, this expected loss is simply the product of the expected loss given default multiplied by the probability of default.

Similar to the approach taken by BOEM, in this test the expected loss given default is simply the expected cost to DR&R the platform. If a lessee fails to complete its DR&R obligations, the State may need to complete the DR&R work. This means that the State could be exposed to the full cost to DR&R the platform. The second quantity, the probability of default, is the central concept addressed by the financial strength test discussed below.

The combination of these two quantities, an assessment of financial strength and estimated cost to DR&R the platform, serves as the basis for establishing a financial assurances regime. One central element in the proposed financial assurances regime is bonding. In the DR&R context, bonding is a technique commonly used in regulation, both in Alaska and in many other jurisdictions, to minimize exposure to a lessee's inability to return land to some acceptable level upon lease termination. While there are several types of bond, one strong and common form is surety bond. In essence, a surety bond is a guarantee provided to the State by a third-party that obliges the third-party to fulfill the obligations left unfulfilled by the lessee. The amount that must be paid by the surety in the event of default by the lessee is capped at the penal sum of the bond. Put simply, every dollar secured though surety bond is a dollar reduction in the State's exposure to default of its lessee's DR&R obligation.

Financial Strength Metrics under Consideration

The following are the metrics that the Division of Oil and Gas is considering to assess DR&R default risk and secure financial assurances, including surety bonding, to mitigate this risk.

1.) Value of Equity
2.) Altman's Z-score (or Altman's Z'-score)[2]
3.) Credit rating (as measured by S&P, Fitch, or Moody's) and other measures of financial strength.

Where,

$$\boldsymbol{Value\ of\ Equity} = \begin{cases} Net\ Worth\ (i.e., Total\ Assets - Total\ Liabilities)\ for\ private\ entities \\ Market\ Value\ of\ Equity\ (i.e., market\ capitalization)\ for\ public\ entities \end{cases}$$

And,

$$\boldsymbol{Altman's\ Z - Score\ (Public\ Entities)} = 1.2\frac{Working\ Capital}{Total\ Assets} + 1.4\frac{Retained\ Earnings}{Total\ Assets} + 3.3\frac{EBIT}{Total\ Assets} + 0.6\frac{Market\ Value\ of\ Equity}{Book\ Value\ of\ Total\ Liabilities} + 0.999\frac{Sales}{Total\ Assets}$$

[2] Altman, Edward. 2000. Predicting financial distress of companies: Revisiting the Z-score and ZETA models. http://pages.stern.nyu.edu/mwg-internal/de5fs23hu73ds/progress?id=+ydbE2N0g+.

Since "Market Value of Equity" is not available for all an alternative version of Altman's Z-score will be used for private entities.

$$\boldsymbol{Altman's\ Z' - Score\ (Private\ Entities)}$$
$$= 0.717\frac{Working\ Capital}{Total\ Assets} + 0.847\frac{Retained\ Earnings}{Total\ Assets} + 3.107\frac{EBIT}{Total\ Assets}$$
$$+ 0.420\frac{Book\ Value\ of\ Equity}{Book\ Value\ of\ Total\ Liabilities} + 0.998\frac{Sales}{Total\ Assets}$$

Rationale for Financial Metrics

Third-party credit ratings were designed explicitly to assess the probability of default through the use of an ordinal scale. Not only do ratings agencies assert that their ratings are predictive of default, they also provide empirical evidence to support the claim. For example, Moody's[3] reports that during the period between 1983 and 2007 cumulative default rates were substantially higher for speculative-grade issues than for investment-grade issues. Similarly, S&P often examines rates of global corporate default. They find that "[a]ll of Standard & Poor's default studies have found a clear correlation between ratings and defaults: The higher the rating, the lower the frequency of default." [4] Importantly, this relationship seems to hold even in times of substantial financial turmoil.

While it appears that third-party credit ratings are predictive of default in the medium- and long-term, there is concern that they are not optimal for short-term default forecasting.[5,6] It is also not clear that third-party credit ratings make efficient use of all available information in the ratings creation process.[7] In light of these concerns, the measure of the probability of default will be augmented through the inclusion of Altman's[8,9] Z-score for public companies and Z'-score for private entities (hereafter jointly referred to as Z-score).

[3] Moody's Global Corporate Finance. 2008. Corporate default and recovery rates, 1920-2007.
[4] Vazza, Diane, and Kraemer, Nick. 2013. 2012 Annual Global Corporate Default Study and Rating Transition. http://www.standardandpoors.com/ratings/articles/en/us/?articleType=HTML&assetID=1245348978068.
[5] For example, Hilscher, Jens, & Wilson, Mungo. 2013. Credit ratings and credit risk: Is one measure enough? March 2013 version.
[6] Moody's argues "we look out over a time horizon of five-to-ten years at least through one full economic cycle. Moody's ratings do not ratchet up or down in response to short-term events such as quarterly earnings reports (http://www.moodys.com/ratings-process/In-a-World-of-Short-Term-Outlooks-Long-Term-Opinions-are-Vital/002004003).
[7] For example, Galil, Koresh. 2005. Ratings as predictors of default in the long term: An empirical investigation. Discussion Paper No. 05-05. Monaster Center for Economic Research, Ben-Gurion University of the Negev.
[8] Altman, Edward. 1968. Financial Ratios, discriminant analysis and the prediction of corporate bankruptcy. Journal of Finance, September 1968.

Altman's Z-score is a common, well-studied, and well-understood measure that has been shown to be quite predictive of default within two years. Altman's Z-score was initially an attempt to (1) quantitatively identify the set of financial metrics most important for forecasting default in a set of public manufacturing firms, and (2) to distill the information contained in the set of metrics down to a single value. Altman later refined the Z- score (by creating the Z'-score) to enhance its applicability and forecasting precision for private and non-manufacturing firms. With respect to accuracy, Altman found that in a sample of 66 firms, the Z-score successfully forecast default in 94% of firms, with an incorrect forecast of bankruptcy for 9.1% of firms, and an incorrect forecast of the absence of bankruptcy in 3.0% of firms.

This performance (*i.e.*, high overall accuracy with substantially higher false-positive than false-negative rate) is the sort that would be preferred by a risk-averse policy maker with a duty to protect the long-term interests of the State. Importantly for our purposes, the Z-score is a widely reported financial metric, can be calculated from financial statements and market capitalization, is commonly used in finance, and balances the tension between forecasting precision and complexity.

The Z-Score forecasting performance discussed above relates to a forecast of default in the next year. In subsequent analyses using data from companies during the thirty year period from 1969 through 1999, the Z-score model was 82%-94% accurate at forecasting default in the next year.[10] When the metric uses financial data to predict default in the next two years, predictive accuracy declines somewhat to 72%. It should also be noted that embedded in the Z-score is the debt-to-equity ratio, one of the three metrics used by BOEM to measure financial strength.

For the reasons outlined above, the central measure of the probability of default being considered is Altman's Z-score. Third-party credit rating may also be used inform the final DR&R assurances required of the lessee. We are further considering measuring financial strength through the use of financial size. As commonly found in the literature, size is an important predictor of default – all else being equal, larger firms are less likely to default than smaller firms. Similar to BOEM, here we are considering using net worth or market value of equity as a proxy for size, where market value of equity will be used for publicly traded firms and net worth will be used for private entities.

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[9] Altman, Edward. 2000. Predicting financial distress of companies: Revisiting the Z-score and ZETA models. http://pages.stern.nyu.edu/mwg-internal/de5fs23hu73ds/progress?id=+ydbE2N0g+.

[10] *Id*.

Threshold Values for the Set of Financial Metrics under Consideration

With respect to our measures of the probability of default, there are guidelines that can help inform the thresholds. Every rating agency clearly defines investment- and speculative-grade ratings. An S&P rating of BBB- or better or a Moody's rating of Baa3 or better is considered investment grade.

The Altman's Z-score has empirically derived thresholds with Z and Z'- scores;

- greater than 2.99 and 2.9, respectively, indicating "safe" financial risk,
- from 1.8 to 2.99 and 1.23 to 2.9, respectively, indicating "cautionary" financial risk,
- below 1.8 and 1.23, respectively, indicating "distressed" financial risk.

Value of Equity is a measure of company size. Given the high estimated DR&R costs for offshore platforms (often exceeding $100 million), and the substantial uncertainty surrounding the difference between estimated and realized cost at decommissioning, a lessee should be sufficiently capitalized to both safely operate offshore infrastructure as well as meet its DR&R liability. We are considering measuring the Value of Equity for private entities through the use of net worth, defined as the difference between total assets and total liabilities. We are further considering measuring the Value of Equity for public entities as the unweighted arithmetic average of the first-day-of-the-month market close capitalization for each month within the 12-month period used in its annual financial statements.

We are considering discretizing the Value of Equity in a manner that reflects the risk to State. The first strata of Value of Equity may be those entities with a Value of Equity less than $100 million.[11] Any lessee with less than $100 million in equity would bond against the full expected cost to DR&R its offshore platform. The Pacific Energy Resources bankruptcy is a compelling example here. In 2007, two years before declaring bankruptcy, Pacific Energy Resources had a book net worth well below this value. As discussed above, this bankruptcy had the very real potential to generate a substantial liability for the State.[12]

We are considering using two additional values to partition Value of Equity: $500 million and $5 billion. Entities with a Value of Equity between $100 and $500 million are typically described as

[11] Also note that BOEM uses $100 million as a net worth threshold when measuring financial strength.

[12] That being said, due to Pacific Energy Resources Ltd.'s Z-score and Value of Equity, the bonding structure considered here would have required Pacific Energy Resources Ltd.to post a bond for 100% of the estimated DR&R liability. This 100% bonding requirement would have been in place at least two years prior to bankruptcy.

small oil and gas entities. Additionally, entities with a Value of Equity between $500 million and $5 billion are typically described as mid-sized oil and gas entities. Entities with a Value of Equity exceeding $5 billion are typically described as large oil and gas entities. Those with a Value of Equity in excess of $100 million would be eligible for incremental bonding, with the share of the estimated DR&R obligation to be secured through bond determined by the Value of Equity, Z-score, and other financial strength measures such as credit rating. As previously noted, for a set of lessees with a given financial strength, default risk decreases as size increases. Thus, all else being equal, the share of estimated DR&R cost to be bonded against decreases as Value of Equity increases.

Bonding Matrix under Consideration

The financial metrics outlined above would be used to quantify an organization's DR&R default risk to the State. The combination of a company's Z-score and Value of Equity would determine its position in the following bonding matrix. In some cases, additional information such as third-party credit rating would be used to inform an entities' final percentage of estimated DR&R obligation secured through bond. After determining the appropriate percentage, the entity would be expected to provide a bond in an amount equal to at least the product of the percentage from the bonding matrix times the estimated cost to DR&R its offshore platform(s).

Figure 1. Bonding Matrix under Consideration

	"Distress" Zone	"Cautionary" Zone	"Safe" Zone
Z Market Value	Z < 1.8	1.8≤ Z ≤ 2.99	Z > 2.99
Z' Book Value	Z' < 1.23	1.23 ≤ Z' ≤ 2.90	Z' > 2.90
	Required Bond [% of DR&R]		
5≤ VE	**Full**	**None**	**None**
5 > VE > 0.5	**Full**	**Incremental**	**None**
0.5 > VE > 0.1	**Full**	**Incremental**	**Incremental**
VE ≤ 0.1	**Full**	**Full**	**Full**

Value of Equity [$2013 billion]

Default Risk Increasing (down the rows)

Default Risk Increasing (toward the left)

Periodic Financial Strength Evaluation and Data Reporting

The value of the financial strength examination presented above would be substantially strengthened if the examination is not a "one-off" occurrence. Regularly updated assessments benefit both the lessee and the State. The financial health of a lessee, and therefore the default risk to the State, varies through time. As the time elapsed since the last evaluation grows, the likelihood that the outcome from the last financial strength test remains valid declines. If the lessee's financial strength improves through time, then the financial assurances held by the State may over-secure the State's true exposure. Conversely, if the financial health of a lessee declines, then the financial assurance held by the State may inadequately protect the State's position.

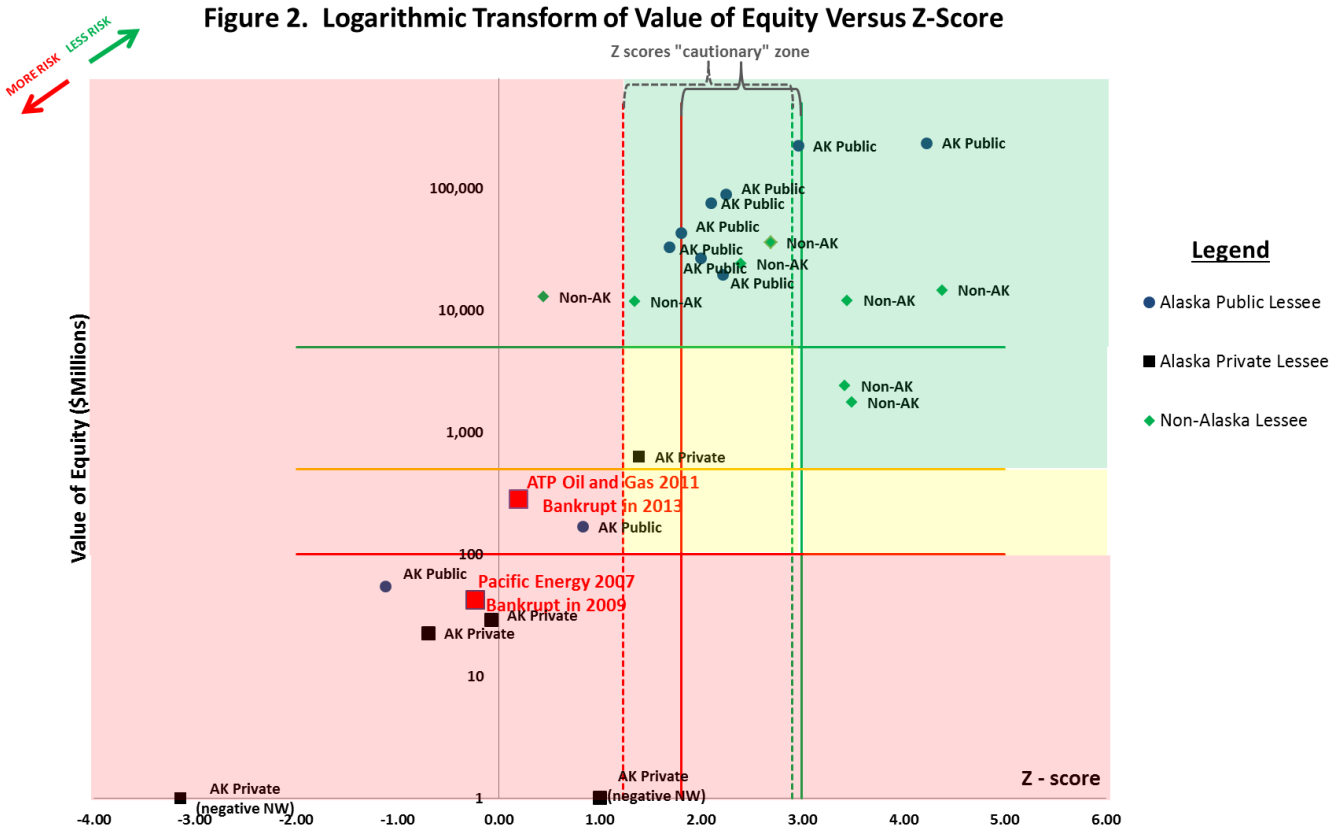
For this reason, the financial strength test outlined above should be conducted periodically, with the financial assurances required of the lessee to be adjusted to reflect the result from the most recent financial strength examination. It is expected that as a lessee's financial condition changes over time, the financial metrics discussed above will allow the State to observe the lessee's changing financial health and adjust the level of assurances required of a lessee.

It should also be noted that the financial strength measures discussed above are not expected to impose any exceptional additional accounting or auditing burden. In order to conduct the above financial strength test, the State would require nothing more than a set of audited financial statements from the lessee. These audited financial statements are effectively identical to those reported by all firms publicly traded in the United States.

Empirical Validation

The following figure plots Value of Equity[13] against Z-score for a set of selected producers. The chart also displays the previously discussed thresholds for the two parameters. The shading in the figure corresponds to the shading observed in the above bonding matrix. The data seems to support the claim that the discussed bonding scheme is able to capture financial strength and default risk. In particular, note that the data points shown as red squares are two recent bankruptcies. The bonding scheme discussed in this work would have been reasonably able to detect these bankruptcies prior to their occurrence, and, had both firms owned platforms on State land, would have left the State with less need to expend State funds to complete the bankrupt entities' DR&R obligation.

[13] Value of Equity is displayed on a log scale to accommodate the large range of values.



Guarantors and Additional Assurances at the Commissioner's Discretion

In addition to the bond required under the matrix above, the commissioner may retain the discretion to require additional assurances from lessees offshore south of the 68th parallel. While the above bonding matrix attempts to use quantitative financial information to understand and mitigate the default risk experienced by the State, it is conceivable that in some situations the commissioner may conclude that the lessee poses a greater risk to the State than is reflected in the risk assessment matrix. In such cases, the commissioner may find it in the best interest of the State to increase the required bond amount, require third-party guaranty, or develop an alternate form of additional assurance.