Joint meeting of SPEE and SPE-GCS Reservoir Study Group

January 9, 2019

Perspectives on Oil & Gas Reserve Due Diligence and Technical Evaluation by Capital Providers

Manoj Devashish, PE, Citigroup

Table of Contents

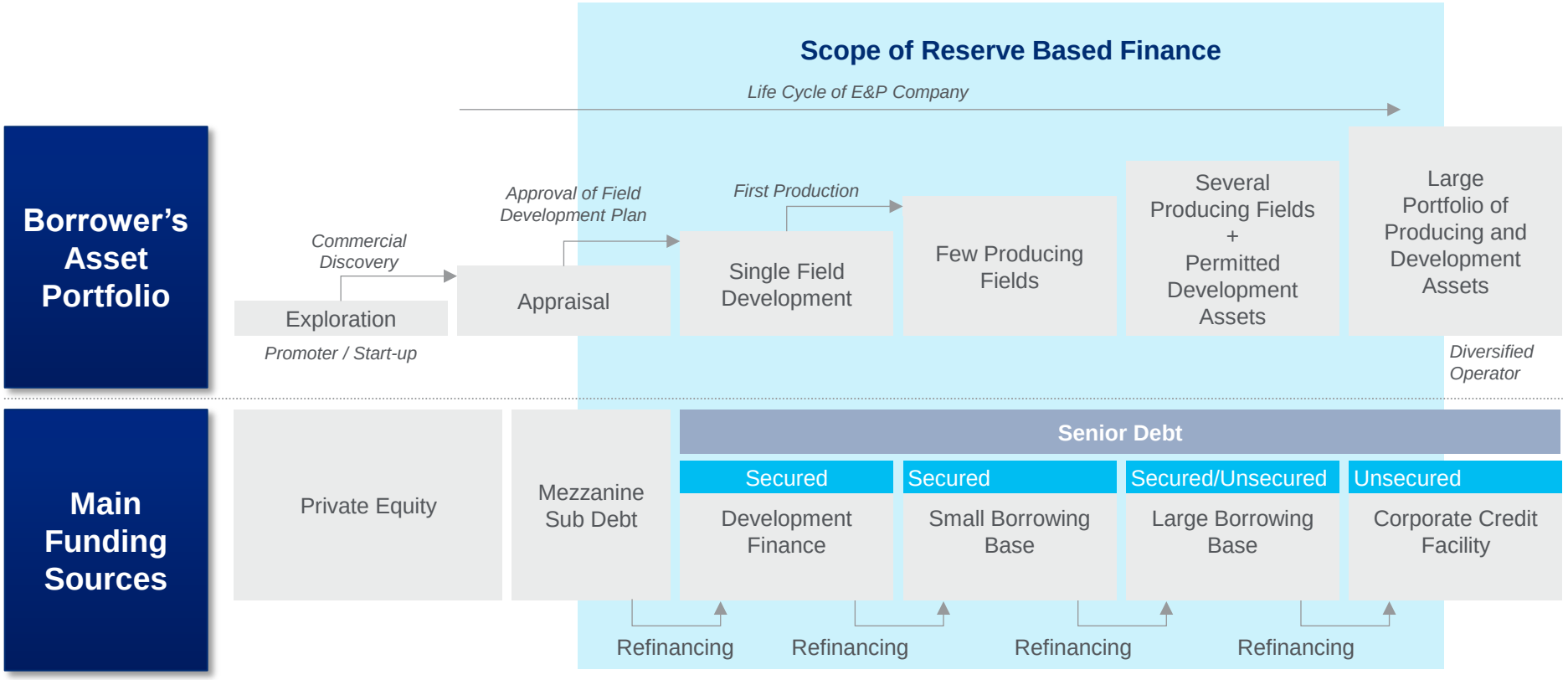
Acknowledgement

I would like to express my gratitude to my colleagues Phil Ballard, John Homier, and Jeff Ard for their assistance in developing this presentation, and to thank my employer Citigroup for allowing me to present at this meeting.

E&P Sector Capital Providers

Reserve Based Finance Continuum

Various financing tools are available to E&P companies throughout their full life cycle.



Complementary Funding or Market Resources		
	High Yield Bonds	IG Bonds
	Equity Capital Markets	
	Hedging	

Source: Ballard, 2018

Common Equity

An E&P company whose assets are in the exploration and/or appraisal phases is typically equity funded.

Common Equity

- Focus on Management Team
  - Relationship based
  - Track record
- Growth Objective
  - Sources and magnitude of upside
  - Likelihood of upside realization
  - Risk factors, correlation, joint probabilities
  - Downside scenarios
- Control
  - Voting rights
- Governance
  - Board composition
- Exit Strategy
  - 5 to 10 year investment horizon
  - A variety of rights with respect to liquidity and/or sale

Secured Bank Debt

At some point during the development phase of its assets, an E&P company would be able to obtain secured bank debt. The capital structure would then comprise of a combination of secured bank debt and common equity.

Secured Bank Debt

- In the United States, lenders employ a Reserve Based Loan ("RBL") structure for offering secured bank debt
  - Secured with 1st lien mortgages on proved reserves
  - Negative pledge on all other assets
  - Total leverage (debt to ebitda) < 3x
  - Requirements for commodity hedging and balance sheet liquidity
  - Interest rate typically in the range of 2% to 4% over LIBOR
  - 3 to 5 year tenor
- Reliable Source of Capital
  - Loans syndicated to experienced participants in a large bank market
- Illustrative Borrowing Base ("BB") Parameters
  - Advance Rates: PDP 65%, PDNP 45%, PUD 25% subject to a limit on non-PDP contribution to BB
  - Computation takes into account roll-off period, reduction for sub debt, and price hedges
- Periodic Borrowing Base Redeterminations
  - PDP focused analysis
  - Typically semi-annual redetermination
  - Balance sheet liquidity critically important
  - 100% lender consent required for an increase in the Borrowing Base

Common Equity

- *Discussed on the previous slides*

Leveraged Finance

Seeking balance between business growth and cost of funds, E&P managers find the Leveraged Finance ("LevFin") markets to be an attractive source of capital for subordinated debt.

Secured Bank Debt

- *Discussed on the previous slides*

Leveraged Finance

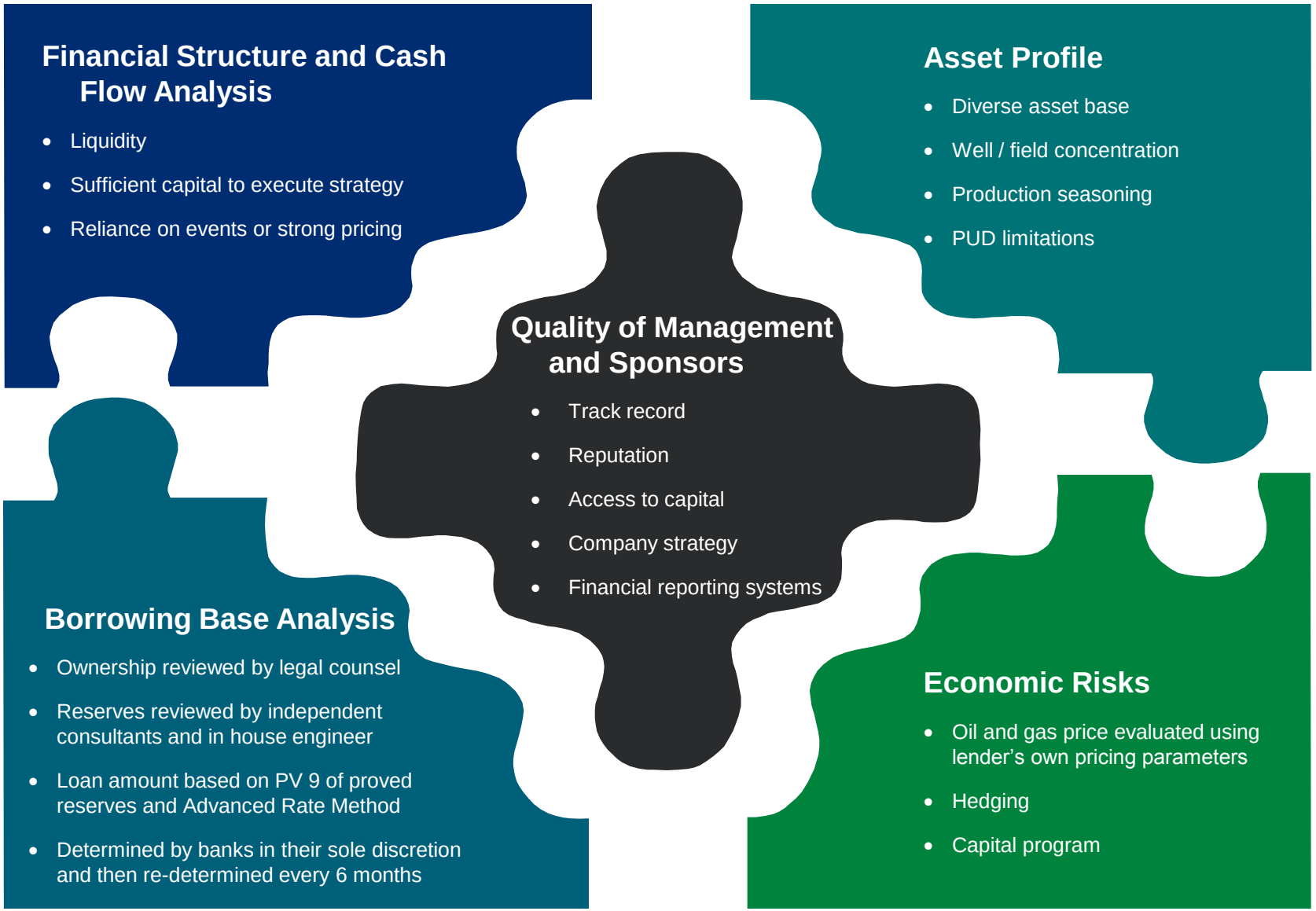
- Unsecured Bonds
  - Greater disclosure requirements
    - Historical audited financials
  - Minimum size (~$400 million)
  - 5 to 7 year tenor
  - Minimal covenants providing the greatest flexibility
  - Total leverage (debt to ebitda) < 3x
  - Split between bank and bonds is based on asset mix (producing vs. developmental)
- 2nd Lien Secured Term Loans
  - Issuers who cannot access bond markets
  - Less disclosure but more covenants
  - More inter-creditor issues due to its secured position
  - Generally cheaper than bonds
  - Market depth has reduced since downturn
- Uni-Tranche Secured Facilities
  - Attractive acreage, however, with very little PDP value

Common Equity

- *Discussed on the previous slides*

Due Diligence Focus

Factors Banks Consider When Granting Loans



Source: Ballard, 2018

Technical Due Diligence Focus – RBL

Using a conservative approach, the Bank engineering analysis is solely based on the proved (1P) reserves with the PDP assets being its primary focus.

Operator	▪ Comfort with the management team
Production	▪ Do the forecasted rates tie with historical rates? If not, what explains the difference? ▪ Is the production history sufficient for the new wells? Does the portfolio have significant value concentrations?
Product Prices	▪ Use of an approved bank price deck and the hedge book
Basis Differentials	▪ Do the forecasted differentials tie with historical differentials? If not, what explains the difference?
Operating Costs	▪ Do the forecasted costs tie with historical costs? If not, what explains the difference? ▪ Treatment of costs associated with uneconomic or non-commercial wells
Capital Costs	▪ Past performance versus AFE

Technical Due Diligence Focus – Equity

Equity evaluation is more comprehensive and includes an analysis of both the magnitude and the likelihood of upside / downside scenarios.

Operator

- Corporate and field office personnel/capabilities
- Field communication, data feeds, software packages
- Joint operating agreements (“JOA”) and the ongoing management of relationships with working interest partners and surface owners

Oil & Gas Assets

- Detailed evaluation of geological and geophysical (“G&G”) data
- Leasing, acreage acquisitions/trades
- Lease expiration schedule, pooling, unitization, farm-in, farm-out, right of way
- Oilfield services/equipment availability, contracting, and project management

Sales and Hedging

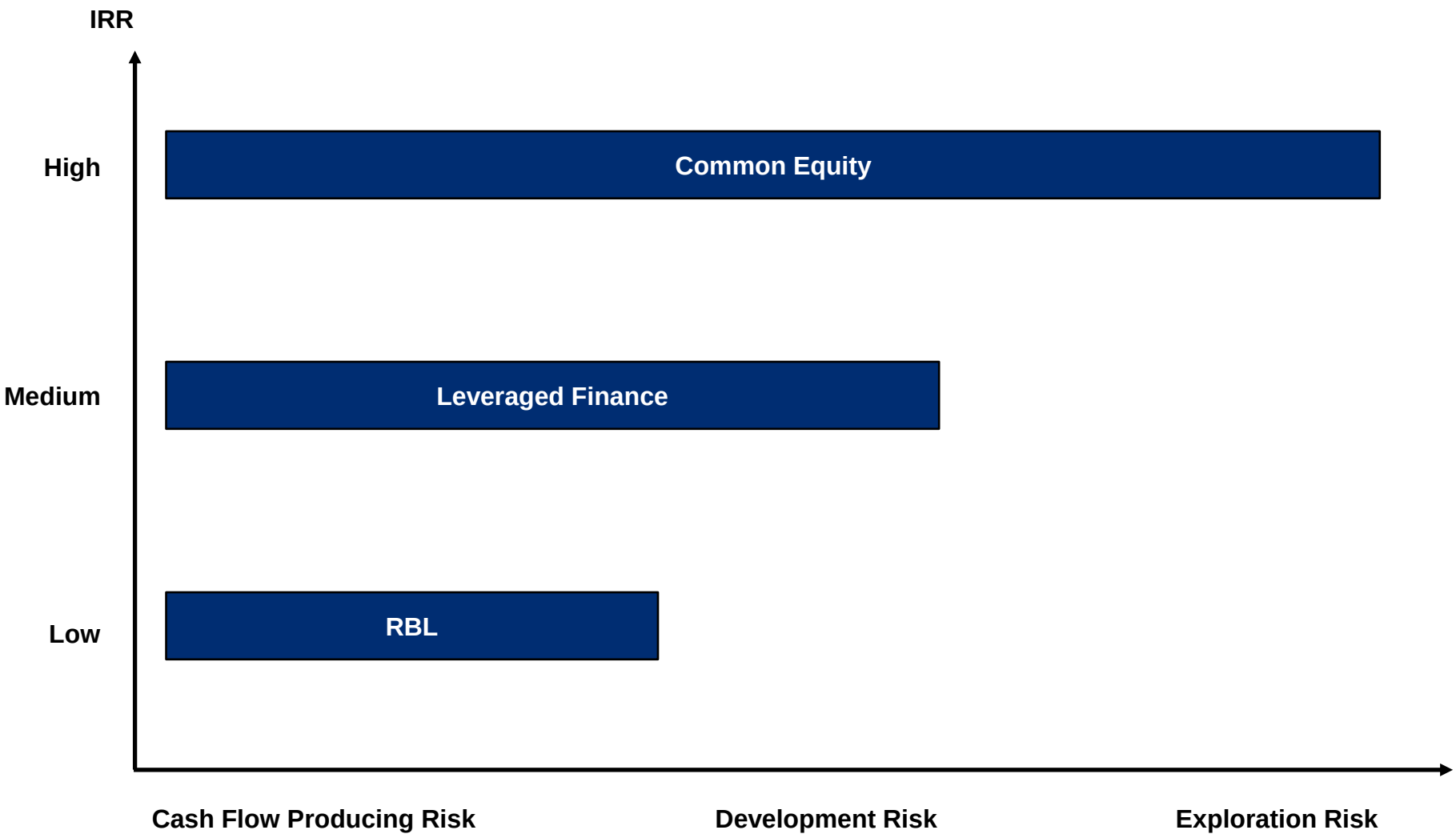
- Midstream strategy with detailed plans
- Transport and capacity issues
- Offtake arrangements
- Hedging strategy for non-PDP assets

Other

- Environmental; Insurance; Performance bonds
- Legal impacting reserves/value (carried interests, reversionary interests, preferential purchase rights, non-competes)
- Ongoing strategic evaluation of assets for acquisitions and divestitures (“A&D”)

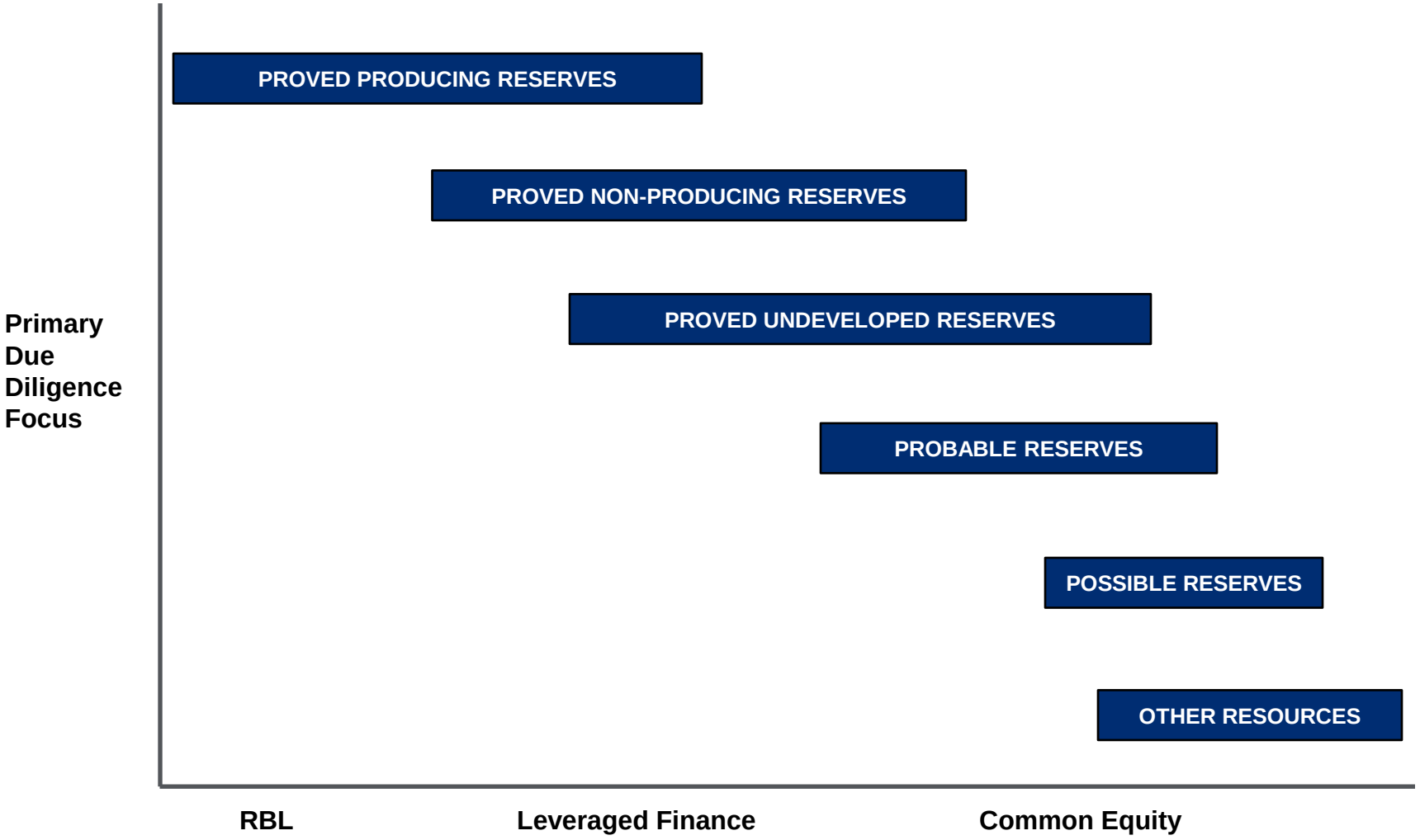
Source: Devashish, 2014; SPE-169858-MS

Positioning of Capital Providers in the Investment Space



Source: Homier, 2008 includes author's changes

Due Diligence Focus Shifts and Expands Based on Investment Attributes



Source: Homier, 2008 (After Zorich) includes author's changes

Update on Reserve Based Lending

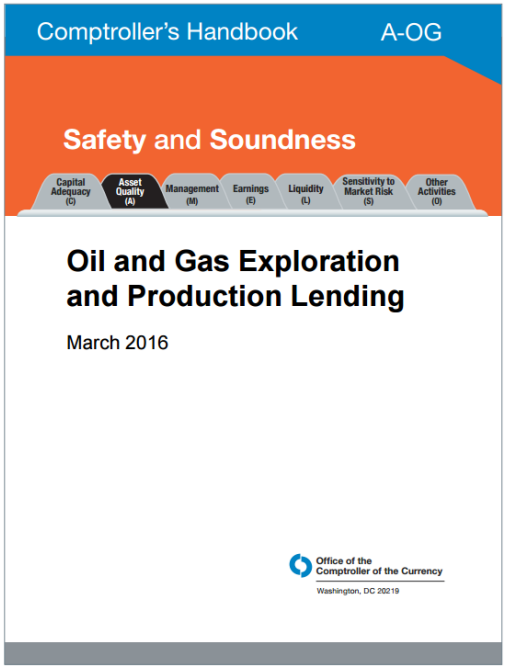
Structural Enhancements from Lessons Learned

As a result of lessons learned from the downturn and credit challenge, banks have enhanced Credit Agreements to be more Lender friendly and Regulator compliant.

Security	• Increase in the mortgage percentage to 85 to 95% • Inclusion of Deposit Account Control Agreements • Inclusion of Anti Cash Hoarding
Proforma Structure	• Maximum leverage < 4.0x • Opening Leverage 2.0 - 2.5x • Opening Liquidity of 15 - 20% • Minimum Equity checks of 50% • Minimum initial Hedging of 3 - 5 years at 80 - 95% of estimated production
Restricted Payments	• Tighten constraints on distribution, based on leverage (< 2.5 – 2.75x) and liquidity (> 15 – 20% availability of borrowing base)

Source: Ballard, 2018

OCC Handbook



Test	Pass	Special Mention	Sub Standard	Doubtful	Loss
RBL Repayment	< 60% Eco. Reserve Life	60% - 75% Eco. Reserve Life	> 75% Economic Reserve Life		
Total Secured Repayment	< 75% Eco. Reserve Life	75% - 90% Eco. Reserve Life	> 90% Economic Reserve Life		
Total Funded Debt ÷ EBITDAX	< 3.5x	3.5x - 4.0x	> 4.0x		
Total Funded Debt ÷ Total Capital	< 50%	50% - 60%	> 60%		
Total Committed Debt ÷ Total Reserves	< 65%	65% - 75%	> 75%		
			Debt < 100% Risked Reserves	Debt Above Substandard < 100% Unrisked Reserves	Remaining Debt > 100% Unrisked Reserves

"These factors and characteristics are not all inclusive, nor are they meant to be 'bright lines' for rating purposes, because other factors or characteristics may be present that influence the analysis and rating decision."

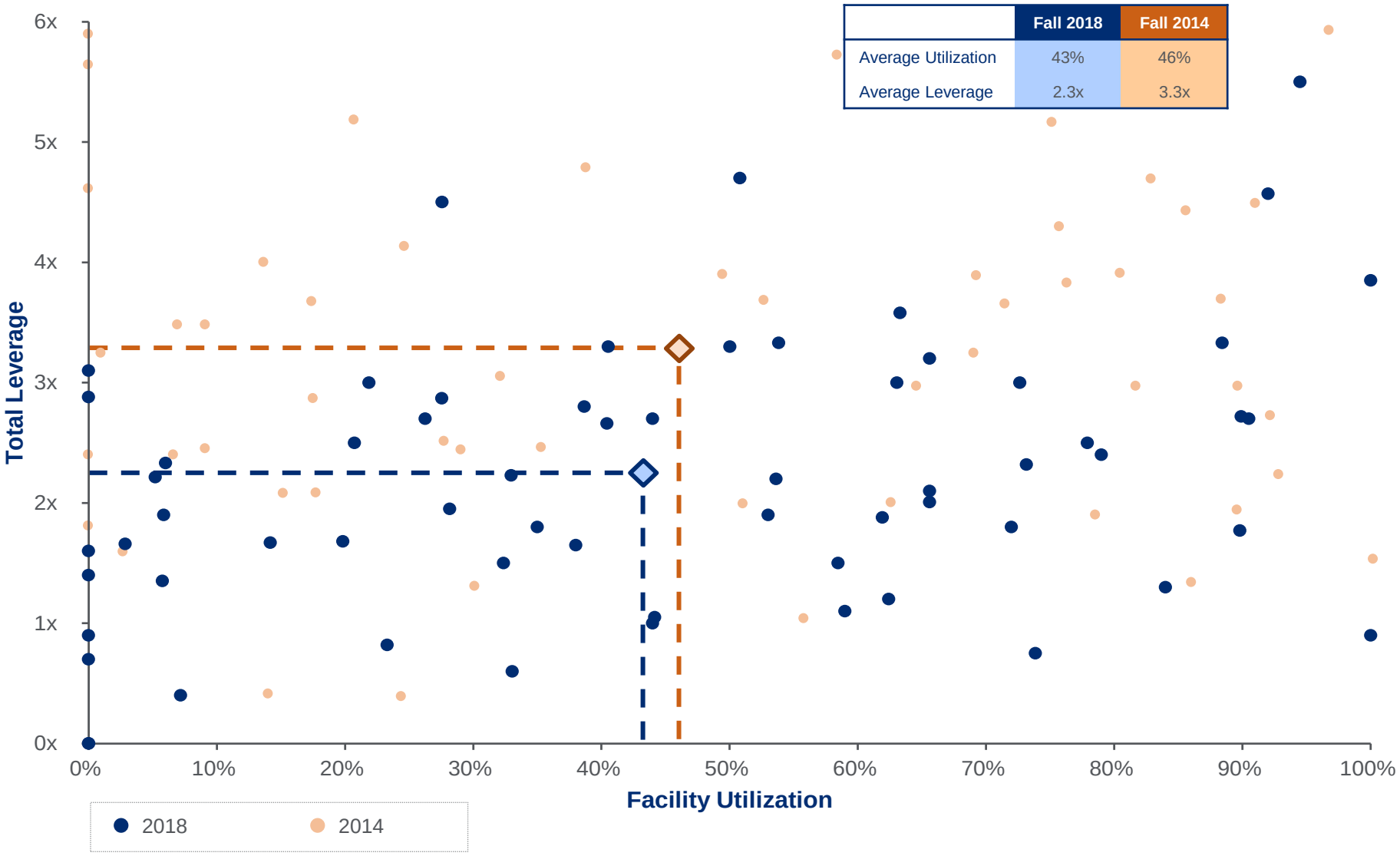
Considerations for Leverage

- **Historical Leverage**
  - Interpretation on which EBITDA to use when measuring against the OCC's guidance of 3.5x for a Pass credit
  - Have seen the use of LTM, L6M, or LQA depending on the cash flow profile of assets, and the underlying commodity price environment
- **Projected Leverage**
  - Banks typically require all projected periods to be below 3.5x leverage when originating loans
- **Gross vs. Net Leverage**
  - Gross vs. Net Leverage is not explicitly addressed in the OCC guidance
  - OCC guidance describes the leverage test as: "Total funded debt ÷ EBITDAX"

Source: Ballard, 2018

Upstream Non-Investment Grade – Systemic Leverage Trend

Since the downturn that began in 2H 2014, systemic leverage in this sector has been reduced by 1x on average while utilization of the credit facility has remained the primary low cost capital source for liquidity and capex.



Note: 2018 leverage as of 9/30/18. 2014 leverage as of 9/30/14.

Source: Ballard, 2018

RBL Market Themes

Fall Redetermination Results

- Capital deployment / improved pricing buoyed borrowing bases on average this Fall
  - 42% of credits increased by an average of **33%**
  - 36% of credits remained **flat**
  - 22% of credits decreased by an average of **9%**
- Majority of redeterminations / new transactions completed prior to recent oil price drop
  - Benefitted from the sticky nature of bank price deck adjustments
- Select clients successfully refinanced exit-facilities into new 5 year deals at market terms, generally accompanied by a strong balance sheet and business opportunity set

Bank Market

- Bank market remains robust for well structured and regulatory compliant transactions
  - Several banks sidelined in 2016/17 came back into the market
  - Lower supply of new deals (size/number) feeding more aggressive bank behavior
  - While we estimate ~60 banks were active in the space at its peak, we believe only ~30 are actively seeking out new RBL exposure
  - Regulatory outlook remains stable
- Borrower-friendly shifts started in earnest in early 2018 – with decreases in drawn pricing, some loosening of Restricted Payments ("R/P") baskets and lighter security package requirements

Source: Ballard, 2018

RBL Market Themes (continued)

Acquisition Financings

- Recent transactions continue to showcase conservative capital structures
  - Low / moderate leverage
  - Extensive hedging for multiple years
  - Free cash flow driven business models
- Transactions largely oversubscribed with banks committing above invite levels
  - Retail syndication participants focusing on drawn balances, ongoing hedging, growth, and capital markets activities
- Wave of upstream de-SPAC transactions demonstrate Lender willingness to support large, complex transactions with protracted commitment periods on RBL / Bridge financings

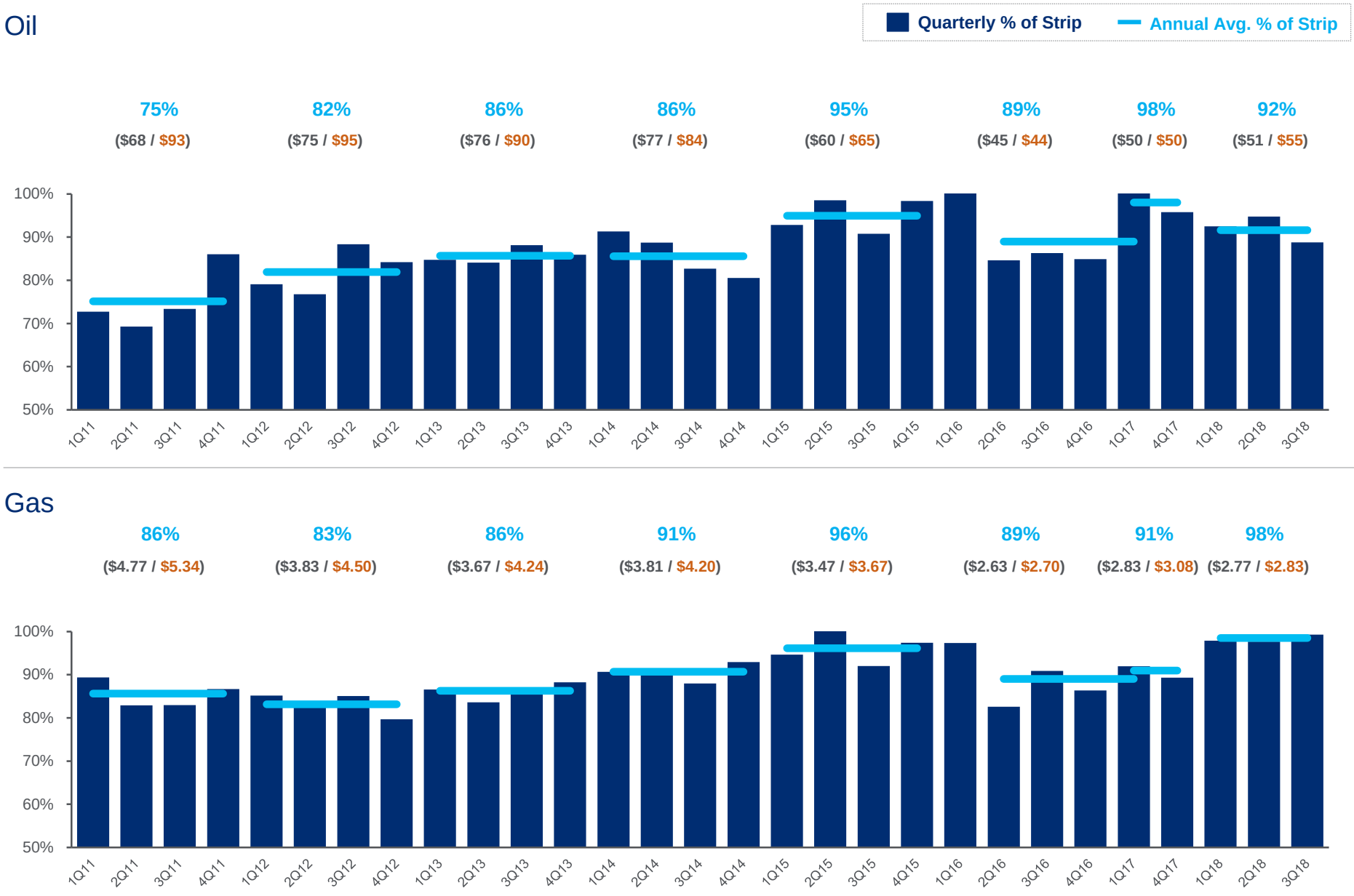
Price Deck Expectations

- Bank price decks are expected to remain sticky absent material price swings
- Current oil sentiment – 1Q19 pricing should mimic the levels and shape of the strip at a slight discount (similar to 1H17); though not discounted to the extent seen in 1H18
- Current gas sentiment – 1Q19 pricing could benefit from recent prompt year uptick, but consistency across the curve is needed for a more material upward trend

Source: Ballard, 2018

Historic Bank Price Deck vs. Forward Curve

Oil

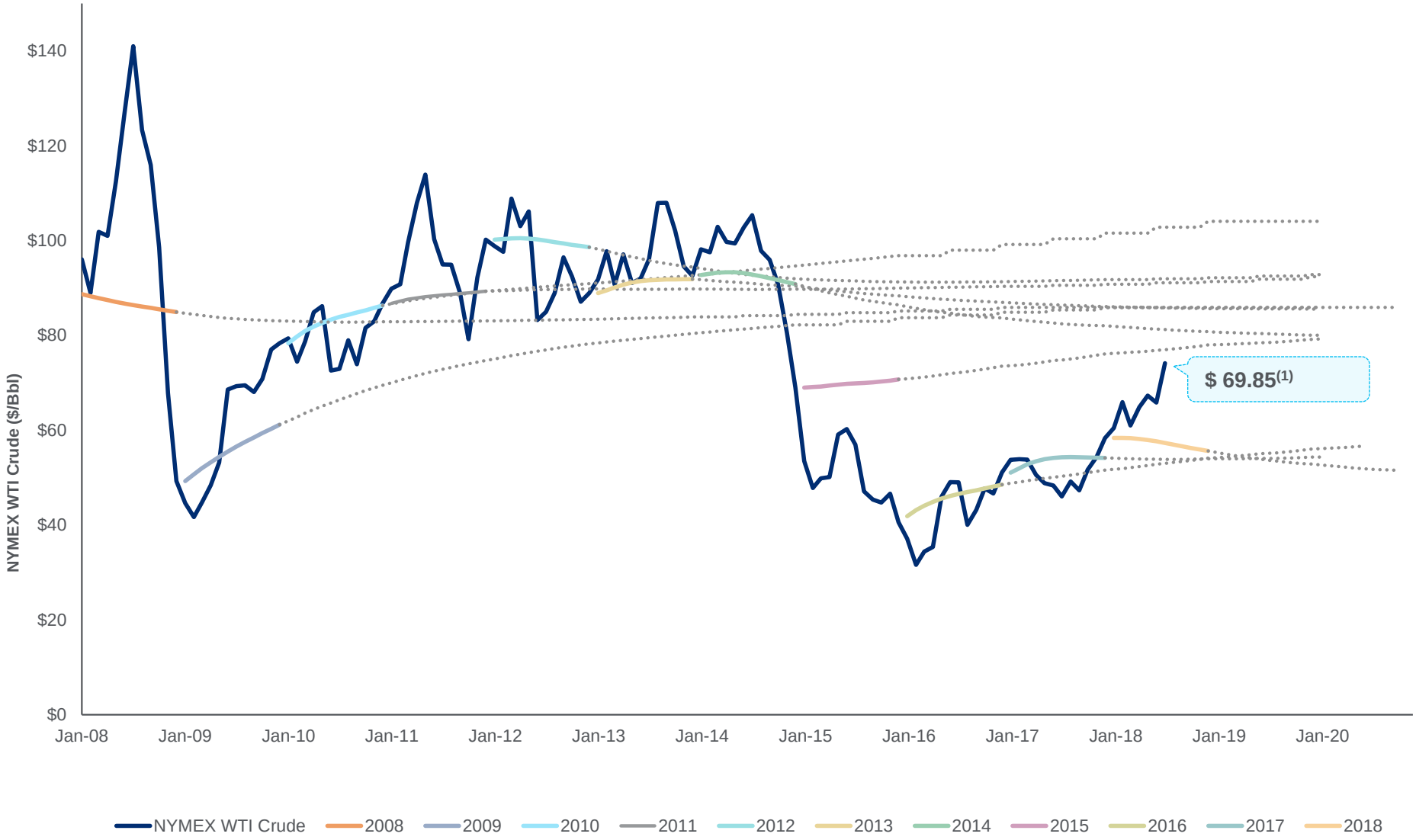


Gas

Note: Quarterly forward curve assumes first day of quarter. Data unavailable for 2Q17 and 3Q17 as source report was not published during those quarters.
Source: Macquarie Energy Lender Price Survey.

Source: Ballard, 2018

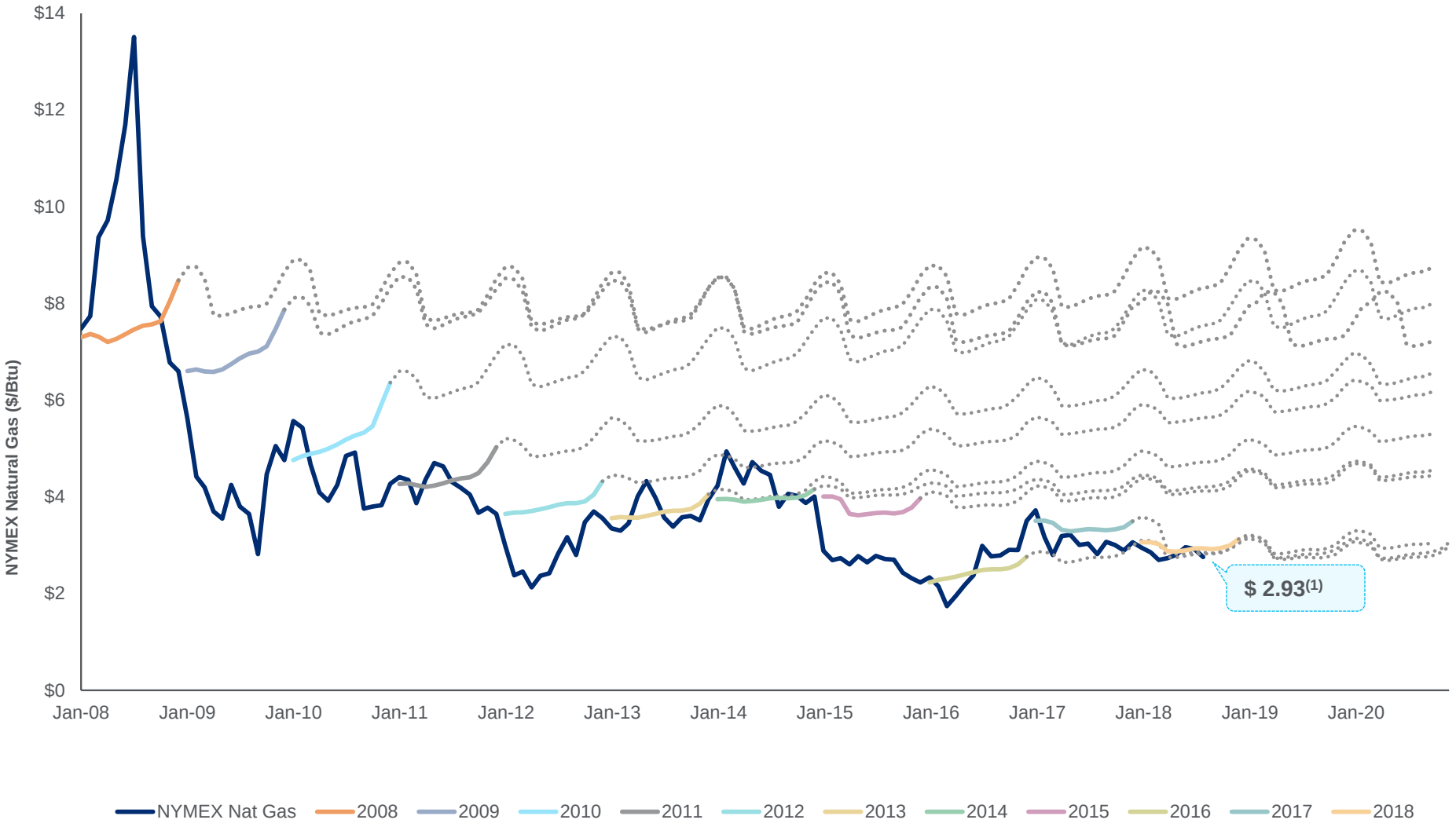
Crude Oil Forward Curve as a Predictor of Actual Price



(1) Spot price as of 9/4/2018.

Source: Ballard, 2018

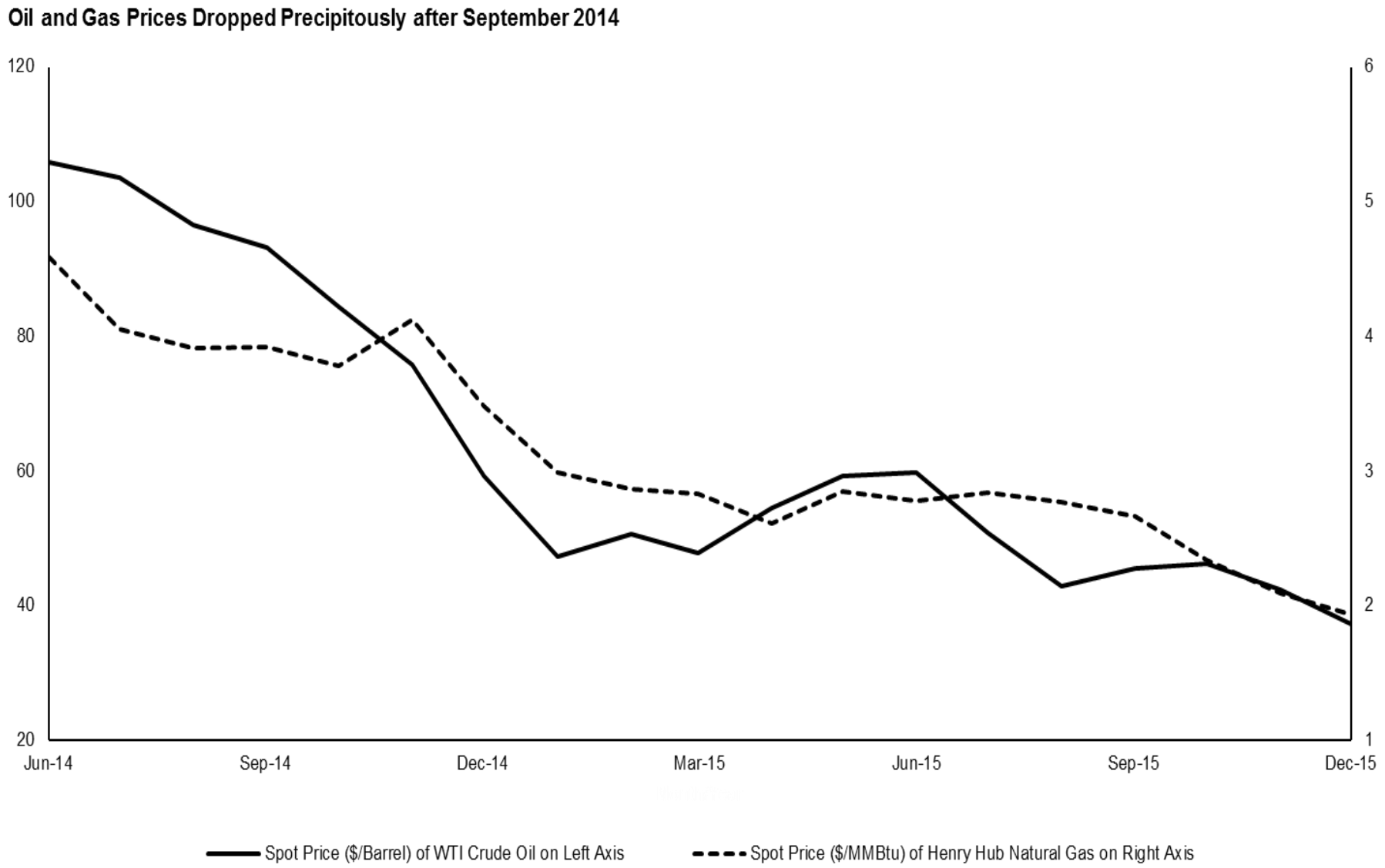
Natural Gas Forward Curve as a Predictor of Actual Prices



(1) Spot price as of 9/4/2018.

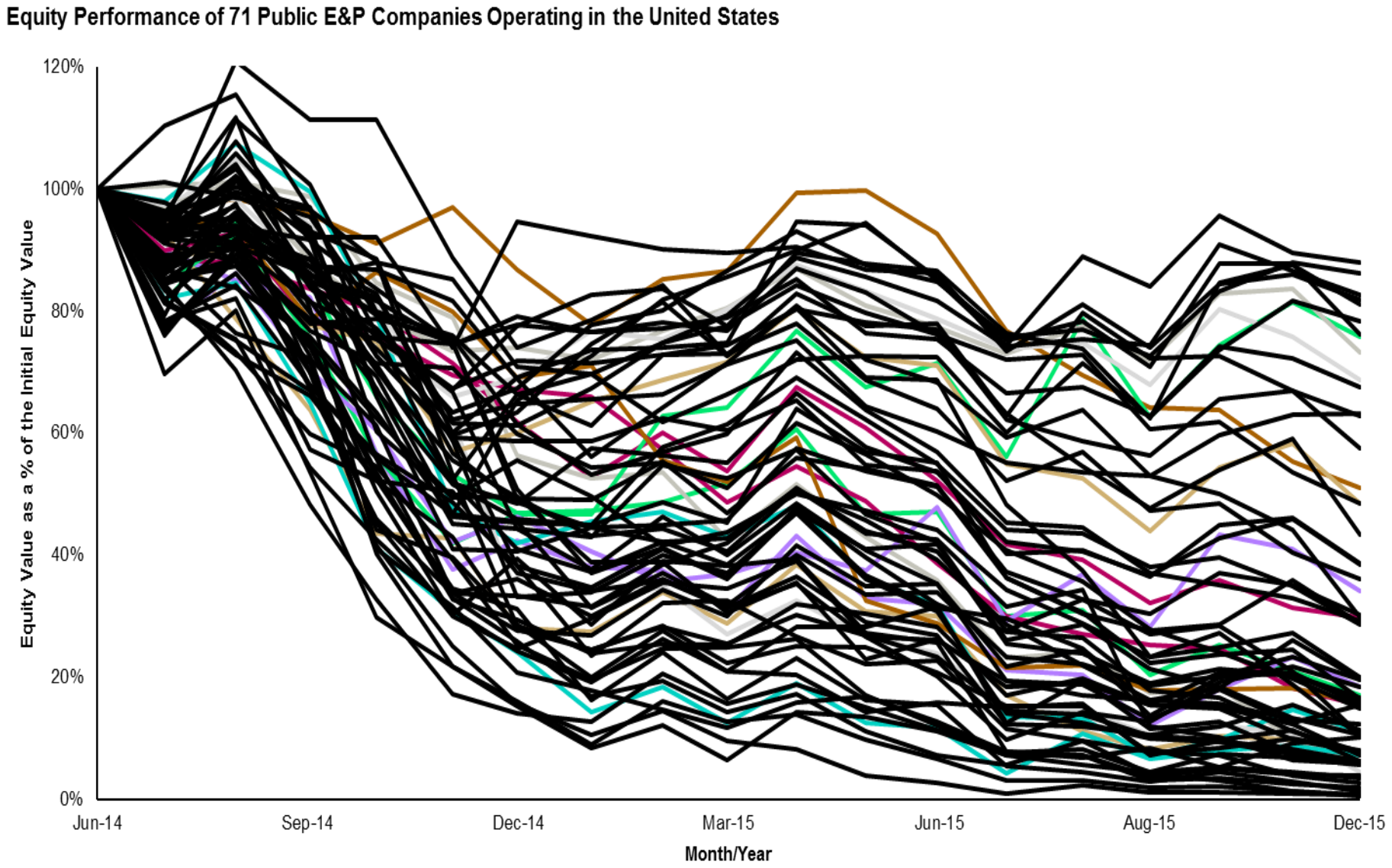
Source: Ballard, 2018

Last Commodity Downturn



Source: Devashish, 2016; SPE-179987-PA

Over a third of E&P companies lost >90% of equity value; Some Fared Well



Source: Devashish, 2016; SPE-179987-PA

Conclusions

Knowledge of reserve based capital providers and their due diligence focus is key to prudent E&P management

- A variety of reserve based capital sources are available to E&P companies.
  - RBL
  - Leveraged Finance
  - Common Equity
- The focus of technical due diligence shifts and expands based on the investment attributes targeted by the capital provider.
  - Bank engineering analysis is solely based on the proved (1P) reserves with the PDP assets being its primary focus
  - Leveraged finance evaluates the growth story; keeps the 1P assets as its primary focus
  - Equity analysis expands to include other reserve and resource categories
- Bank market remains robust for well structured and regulatory compliant transactions.
  - Bank price decks are expected to remain sticky absent material price swings
  - 1Q19 oil pricing should mimic the levels and shape of the strip at a slight discount
  - Debt capacity can dramatically reduce following a commodity downturn
  - By hedging production adequately, an E&P company could neutralize the adverse effect of debt on its equity value

IRS Circular 230 Disclosure: Citigroup Inc. and its affiliates do not provide tax or legal advice. Any discussion of tax matters in these materials (i) is not intended or written to be used, and cannot be used or relied upon, by you for the purpose of avoiding any tax penalties and (ii) may have been written in connection with the "promotion or marketing" of any transaction contemplated hereby ("Transaction"). Accordingly, you should seek advice based on your particular circumstances from an independent tax advisor.

In any instance where distribution of this communication is subject to the rules of the US Commodity Futures Trading Commission ("CFTC"), this communication constitutes an invitation to consider entering into a derivatives transaction under U.S. CFTC Regulations §§ 1.71 and 23.605, where applicable, but is not a binding offer to buy/sell any financial instrument.

Any terms set forth herein are intended for discussion purposes only and are subject to the final terms as set forth in separate definitive written agreements. This presentation is not a commitment to lend, syndicate a financing, underwrite or purchase securities, or commit capital nor does it obligate us to enter into such a commitment, nor are we acting as a fiduciary to you. By accepting this presentation, subject to applicable law or regulation, you agree to keep confidential the information contained herein and the existence of and proposed terms for any Transaction.

Prior to entering into any Transaction, you should determine, without reliance upon us or our affiliates, the economic risks and merits (and independently determine that you are able to assume these risks) as well as the legal, tax and accounting characterizations and consequences of any such Transaction. In this regard, by accepting this presentation, you acknowledge that (a) we are not in the business of providing (and you are not relying on us for) legal, tax or accounting advice, (b) there may be legal, tax or accounting risks associated with any Transaction, (c) you should receive (and rely on) separate and qualified legal, tax and accounting advice and (d) you should apprise senior management in your organization as to such legal, tax and accounting advice (and any risks associated with any Transaction) and our disclaimer as to these matters. By acceptance of these materials, you and we hereby agree that from the commencement of discussions with respect to any Transaction, and notwithstanding any other provision in this presentation, we hereby confirm that no participant in any Transaction shall be limited from disclosing the U.S. tax treatment or U.S. tax structure of such Transaction.

We are required to obtain, verify and record certain information that identifies each entity that enters into a formal business relationship with us. We will ask for your complete name, street address, and taxpayer ID number. We may also request corporate formation documents, or other forms of identification, to verify information provided.

Any prices or levels contained herein are preliminary and indicative only and do not represent bids or offers. These indications are provided solely for your information and consideration, are subject to change at any time without notice and are not intended as a solicitation with respect to the purchase or sale of any instrument. The information contained in this presentation may include results of analyses from a quantitative model which represent potential future events that may or may not be realized, and is not a complete analysis of every material fact representing any product. Any estimates included herein constitute our judgment as of the date hereof and are subject to change without any notice. We and/or our affiliates may make a market in these instruments for our customers and for our own account. Accordingly, we may have a position in any such instrument at any time.

Although this material may contain publicly available information about Citi corporate bond research, fixed income strategy or economic and market analysis, Citi policy (i) prohibits employees from offering, directly or indirectly, a favorable or negative research opinion or offering to change an opinion as consideration or inducement for the receipt of business or for compensation; and (ii) prohibits analysts from being compensated for specific recommendations or views contained in research reports. So as to reduce the potential for conflicts of interest, as well as to reduce any appearance of conflicts of interest, Citi has enacted policies and procedures designed to limit communications between its investment banking and research personnel to specifically prescribed circumstances.

Citi believes that sustainability is good business practice. We work closely with our clients, peer financial institutions, NGOs and other partners to finance solutions to climate change, develop industry standards, reduce our own environmental footprint, and engage with stakeholders to advance shared learning and solutions. Citi's Sustainable Progress strategy focuses on sustainability performance across three pillars: Environmental Finance; Environmental and Social Risk Management; and Operations and Supply Chain. Our cornerstone initiative is our $100 Billion Environmental Finance Goal – to lend, invest and facilitate $100 billion over 10 years to activities focused on environmental and climate solutions.