“High-Yield Lending: It’s Good, Until It’s Not!”
[See: PREA-Sponsored JPM RE Issue]

Joseph L. Pagliari, Jr.
Clinical Professor of Real Estate
November 13, 2018
12th Annual Real Estate Conference
Chicago, Illinois
Mezz/High-Yield Debt: Agenda

► Context & Motivation:
  ▪ Fund-raising activities
  ▪ Low-return environment/high prices
  ▪ Lenders’ capital restrictions

► Mezz Mechanics:
  ▪ The credit curve as a \( f(\text{leverage}) \)
  ▪ Asset-level volatility → default risk
  ▪ A first look at expected returns & volatility (mezz tranche)

► Mezz Nuances:
  ▪ Mezz debt & levered loans
  ▪ Mezz debt without sufficient lender liquidity

► Mezz v. Equity Returns:
  ▪ Expected returns & volatility
  ▪ Bounded (mezz) returns v. unbounded (equity) returns
For (year-to-date) 2018, there are 70 high-yield debt funds in the market, looking to raise nearly \( \approx \$65 \) billion of equity capital.

The median targeted net return was 11.0%, with a weighted average of \( \approx 12.6\% \).

Over the same time, the yield on the 5-year U.S. Treasury bond has averaged \( \approx 2.7\% \).

Sources: *Commercial Mortgage Alert*, St. Louis Federal Reserve Bank and the author’s calculations.

The figures above do not include the high-yield mortgage REITs; *e.g.*:

- Blackstone (BXMT): \( \$3.9 \) billion (of equity), and
- Colony Northstar: \( \$3.2 \) billion (of equity).
A look at the ten largest debt funds:

Sources: Bisnow, Preqin, Ltd. and the author’s calculations.
Background: Low-Return Environment

- Significant decline in (unlevered) core returns and the decline is expected to continue:

Source: PREA Consensus Forecast of the NCREIF Property Index as of 3rd Quarter, 2018.
"... I define a bubble as a protracted period of falling risk aversion that translates into falling capitalization rates that decline measurably below their long term trendless averages. Falling capitalization rates propel one or more asset prices to unsustainable levels. All bubbles burst when risk aversion reaches its irreducible minimum, i.e. credit spreads approaching zero, though analysts’ ability to time the onset of deflation has proved illusory." {emphasis added}

Background: Investor Motivation

• Low returns have placed significant performance pressures on pension and endowment funds.

• As one example, consider unfunded pension-fund obligations:

As another example, 53% of the average endowment fund is allocated to alternative investments.

Yet, their performance has lagged traditional indices:

<table>
<thead>
<tr>
<th>INSTITUTIONS &amp; BENCHMARKS</th>
<th>1-YEAR</th>
<th>3-YEAR</th>
<th>5-YEAR</th>
<th>10-YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Endowment</td>
<td>-1.9%</td>
<td>5.2%</td>
<td>5.4%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Top 25% of Performers</td>
<td>-0.7%</td>
<td>6.1%</td>
<td>6.2%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Bottom 25% of Performers</td>
<td>-3.3%</td>
<td>4.2%</td>
<td>4.5%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Russell 3000 Index</td>
<td>2.1%</td>
<td>11.1%</td>
<td>11.6%</td>
<td>7.4%</td>
</tr>
<tr>
<td>MSCI World ex-US Index</td>
<td>-9.8%</td>
<td>1.9%</td>
<td>1.2%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Barclays Aggregate Bond Index</td>
<td>6.0%</td>
<td>4.1%</td>
<td>3.8%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Blended 60/40 Index</td>
<td>1.5%</td>
<td>6.6%</td>
<td>6.6%</td>
<td>5.4%</td>
</tr>
</tbody>
</table>

Excess/<Shortfall>    
-3.4%   -1.4%   -1.2%   -0.4%

Background: Lender Constraints

- Large CMBS volume just before the financial crisis:

Annual CMBS Issuance ($ billion) for the Period 1995 - YTD 2018

- Dodd-Frank’s capital/retention requirements (kicked in late 2016)
- Basel III’s risk-based capital requirements (kicked in 2010)

Source: Commercial Mortgage Alert
Mezz/High-Yield Debt: Agenda

► Context & Motivation:
  ▪ Fund-raising activities
  ▪ Low-return environment/high prices
  ▪ Lenders’ capital restrictions

► Mezz Mechanics:
  ▪ The credit curve as a $f$(leverage)
  ▪ Asset-level volatility $\rightarrow$ default risk
  ▪ A first look at expected returns & volatility (mezz tranche)

► Mezz Nuances:
  ▪ Mezz debt & levered loans
  ▪ Mezz debt without sufficient lender liquidity

► Mezz v. Equity Returns:
  ▪ Expected returns & volatility
  ▪ Bounded (mezz) returns $v.$ unbounded (equity) returns
Interest Rates = \( f(\text{Leverage} \mid \text{Loan Characteristics}) \)

Exhibit 1: Illustration of the Cost of Indebtedness as \( f(LTV) \) for a Given Maturity Date

An equilibrium approach to risky debt:
1) At maximum \( LTV, k_d \rightarrow \theta E[k_a] (= f(\sigma_a)) \).
2) This boundary condition sets \( \delta \).
3) \( k_d \uparrow \) as \( LTV \uparrow \).

Approximation of Pricing Function:
\[
k_d = r_f + \gamma + \delta \frac{LTV}{1 - LTV}
\]

For a given loan, the spread \( (\delta) = f(\text{property type, geography, sponsor, tenant(s), etc.}) \) as well as maturity date and fixed- \( \nu \) floating-rate instrument.

Pricing Risky Debt {Borrower has a put option}!

Mortgage Interest Rate

Default Risk (\( \delta \)) Premium

Risk-free Rate (\( r_f \))

Structural Differences (\( \gamma \)) in Payment Schedules, Servicing Fees, Etc.
Interest Rates = \( f(\text{Leverage} \& \text{Collateral Risk}): \sigma_2 > \sigma_1 \)

For example:

Hotels

Exhibit 2: Illustration of the Cost of Indebtedness as \( f(LTV) \) for a Given Maturity Date

- Mortgage Interest Rate\(_1 = f(\sigma_1)\)
- Mortgage Interest Rate\(_2 = f(\sigma_2)\)
- Default Risk (\( \delta_1 \)) Premium
- Default Risk (\( \delta_2 \)) Premium
- Structural Differences (\( \gamma \)) in Payment Schedules, Servicing Fees, Etc.
- Risk-free Rate (\( r_f \))

<table>
<thead>
<tr>
<th>Loan-to-Value Ratio</th>
<th>0%</th>
<th>5%</th>
<th>10%</th>
<th>15%</th>
<th>20%</th>
<th>25%</th>
<th>30%</th>
<th>35%</th>
<th>40%</th>
<th>45%</th>
<th>50%</th>
<th>55%</th>
<th>60%</th>
<th>65%</th>
<th>70%</th>
<th>75%</th>
<th>80%</th>
<th>85%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Rate per Annum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Average v. Marginal Interest Rates

Exhibit 3: Illustration of the Cost of Indebtedness as $f(LTV)$ for a Given Maturity Date

<table>
<thead>
<tr>
<th>Loan-to-Value Ratio</th>
<th>Interest Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>5%</td>
<td>3.5%</td>
</tr>
<tr>
<td>10%</td>
<td>4.0%</td>
</tr>
<tr>
<td>15%</td>
<td>4.5%</td>
</tr>
<tr>
<td>20%</td>
<td>5.0%</td>
</tr>
<tr>
<td>25%</td>
<td>5.5%</td>
</tr>
<tr>
<td>30%</td>
<td>6.0%</td>
</tr>
<tr>
<td>35%</td>
<td>6.5%</td>
</tr>
<tr>
<td>40%</td>
<td>7.0%</td>
</tr>
</tbody>
</table>

At 60% leverage, the interest rate equals 5.00%.
At 65% leverage, the interest rate equals 5.14%.
At 70% leverage, the interest rate equals 5.33%.
At 75% leverage, the interest rate equals 5.60%.
At 80% leverage, the interest rate equals 6.00%.
At 85% leverage, the interest rate equals 6.67%.

This 5% tranche bears an interest rate of 6.86%.
This 5% tranche bears an interest rate of 7.81%.
This 5% tranche bears an interest rate of 9.33%.
This 5% tranche bears an interest rate of 12.00%.
This 5% tranche bears an interest rate of 17.33%.
**Asset-Level Volatility: Mezz Returns Look Different**

- Let’s assume: $E[k_a] = 8\%$ and $\sigma_a = 12\%$

The $\sigma$ of a single NPI property $\approx 12\%$

More broadly, there is very little empirical data available on mezz performance. So, what follows is largely a theoretical discussion. That said, the paper’s appendix contains the mathematics (for a simple, one-period model); so, you can replicate these analyses based on your view of $E[k_a]$, $\sigma_a$, tranches, etc.
Payoff Hurdles to Debt Tranches & Equity

Exhibit 6: Illustration of Payoff Regions to Various (Debt and Equity) Tranches

Whereas debt returns are bounded (at the coupon return), equity returns are unbounded.

[A point which we will revisit.]

Note: In order to avoid a loss, the (highly levered) borrower must realize an asset-level return very near the mean.
Exhibit 6: Illustration of Payoff Regions to Various (Debt and Equity) Tranches

Given:
- $\bar{x} = 8\%$
- $\sigma = 12\%$

Return on Equity Capital @ 80% LTV

Frequency of Asset-Level Returns

- $\text{Prob}(x < \bar{x} - \sigma) \approx 16\%$
- $\text{Prob}(x < \bar{x} - 2\sigma) \approx 2\%$
- $\text{Prob}(x < \bar{x} - 3\sigma) \approx 0\%$

Prob($x < \bar{x}) = 50\%$

Prob($x < \bar{x} - \sigma) \approx 16\%$

Prob($x < \bar{x} - 2\sigma) \approx 2\%$

Prob($x < \bar{x} - 3\sigma) \approx 0\%$

Given:
- $\bar{x} = 8\%$
- $\sigma = 12\%$
Returns to Various Debt Tranches

- Based on assumed asset-level return distribution, consider the expected return and volatility of various high-yield debt tranches:

Exhibit 7: Illustration of Expected Returns and Riskiness by Tranche

<table>
<thead>
<tr>
<th>Portion of Capital Stack</th>
<th>Incremental Interest Rate</th>
<th>Incremental Cumulative Payoffs</th>
<th>Incremental Expected Return</th>
<th>Incremental Standard Deviation</th>
<th>Complete Payoff</th>
<th>Partial Return</th>
<th>Partial Loss</th>
<th>Complete Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>60% -- 65%</td>
<td>6.86%</td>
<td>$68.34</td>
<td>6.83%</td>
<td>1.28%</td>
<td>99.95%</td>
<td>0.00%</td>
<td>0.03%</td>
<td>0.01%</td>
</tr>
<tr>
<td>65% -- 70%</td>
<td>7.81%</td>
<td>$73.73</td>
<td>7.69%</td>
<td>2.91%</td>
<td>99.79%</td>
<td>0.02%</td>
<td>0.15%</td>
<td>0.05%</td>
</tr>
<tr>
<td>70% -- 75%</td>
<td>9.33%</td>
<td>$79.20</td>
<td>8.83%</td>
<td>6.10%</td>
<td>99.18%</td>
<td>0.08%</td>
<td>0.52%</td>
<td>0.21%</td>
</tr>
<tr>
<td>75% -- 80%</td>
<td>12.00%</td>
<td>$84.80</td>
<td>10.22%</td>
<td>11.83%</td>
<td>97.34%</td>
<td>0.29%</td>
<td>1.55%</td>
<td>0.82%</td>
</tr>
<tr>
<td>80% -- 85%</td>
<td>17.33%</td>
<td>$90.67</td>
<td>11.79%</td>
<td>21.41%</td>
<td>92.57%</td>
<td>0.96%</td>
<td>3.81%</td>
<td>2.66%</td>
</tr>
<tr>
<td>85% -- 90%</td>
<td>30.67%</td>
<td>$97.20</td>
<td>14.54%</td>
<td>37.21%</td>
<td>81.59%</td>
<td>3.20%</td>
<td>7.77%</td>
<td>7.43%</td>
</tr>
</tbody>
</table>

Notes on Probability of Repayment:

(a) $\text{Prob}(k_d \geq \text{Payoff})$

(b) $\text{Prob}(\text{Payoff} > k_d \geq 0)$

(c) $\text{Prob}(-1 < k_d < 0)$

(d) $\text{Prob}(k_d = -1)$

Asset Assumptions:

$k_d = 8.00\%$

$\sigma_d = 12.00\%$
• Consider the payoff to the second-riskiest mezz tranche, across a range of asset-level returns:

Exhibit 8: Illustration of Put Option
Payoffs to Mezz Tranche – Supplying 80% to 85% of the Capital Stack

A near binary outcome: earn the coupon yield or lose it all → it's good, until it's not!

A related theme (to be subsequently explored): mezz's bounded (or truncated) upside.
Net Returns to a Particular Debt Tranche

- Consider the LPs’ payoff to the second-riskiest mezz tranche, across a range of asset-level returns:

![Diagram of Payoffs to Mezzanine Tranche](image)

- The typical base fees (1.5%) + pref (8%) & promote (20%) structure is hereafter ignored.

[Note: The JPM removed this exhibit from the original version of the article.]
Mezz/High-Yield Debt: Agenda

► Context & Motivation:
  ▪ Fund-raising activities
  ▪ Low-return environment/high prices
  ▪ Lenders’ capital restrictions

► Mezz Mechanics:
  ▪ The credit curve as a $f(\text{leverage})$
  ▪ Asset-level volatility $\rightarrow$ default risk
  ▪ A first look at expected returns & volatility (mezz tranche)

► Mezz Nuances:
  ▪ Mezz debt & levered loans
  ▪ Mezz debt without sufficient lender liquidity

► Mezz v. Equity Returns:
  ▪ Expected returns & volatility
  ▪ Bounded (mezz) returns v. unbounded (equity) returns
Levered Loans: The Long & Short of It

- With a levered-loan strategy, the lender borrows against the mezz debt.
- Essentially, the lender is “long” the junior piece and “short” the senior piece:

Technically, the high-yield lender is long both tranches. Therefore, the lender's net position is effectively “long” the more-junior tranche. However, the lender's borrowing against both tranches effectively “shorts” the more-senior tranche.

Exhibit 9: Illustration of the Cost of Indebtedness as $f(LTV)$
for a Given Maturity Date

- At 85% leverage, the interest rate equals 6.67%.
- At 80% leverage, the interest rate equals 6.00%.
- At 75% leverage, the interest rate equals 5.60%.
- At 70% leverage, the interest rate equals 5.33%.
- At 65% leverage, the interest rate equals 5.14%.
- At 60% leverage, the interest rate equals 5.00%.
- At 55% leverage, the interest rate equals 4.86%.
- At 50% leverage, the interest rate equals 4.66%.
- At 45% leverage, the interest rate equals 4.46%.
- At 40% leverage, the interest rate equals 4.26%.
- At 35% leverage, the interest rate equals 4.06%.
- At 30% leverage, the interest rate equals 3.86%.
- At 25% leverage, the interest rate equals 3.66%.
- At 20% leverage, the interest rate equals 3.46%.
- At 15% leverage, the interest rate equals 3.26%.
- At 10% leverage, the interest rate equals 3.06%.
- At 5% leverage, the interest rate equals 2.86%.
Levered Loans: “Crossed” Pools ← Risk ↑

- Mezz lender’s borrowing against the fund are cross-defaulted & -collateralized
- Adding significantly more risk than a pure strategy:

Exhibit 10: Illustration of Return on Equity as a Function of Loss Rates with and without "Crossed" Fund-Level Debt

Without defaults, the levered-loan strategy works better

- Fund Makes High-Yield Loans on 75-80% of the Capital Stack, without Fund-Level Debt
- Fund Makes High-Yield Loans on 70-80% of the Capital Stack, Using "Crossed" Fund-Level Debt at 50%

With defaults, the “pure” strategy works better

- 6.3%
- 10.7%
Position in the Capital Stack Can Make All the Difference

- Significant variation in $E(\text{losses})$ as $f(\% \text{ senior } \vee \% \text{ subordinate})$.
- Consider two examples, each occupying 15% of the capital stack:
  - In the first instance, the mezz provides 60-75% financing $\rightarrow E(\text{shortfall}) = 0.21\%$
  - In the second instance, the mezz provides 75-90% financing $\rightarrow E(\text{shortfall}) = 5.06\%$
  - The latter is $> 24x$ the former!

Exhibit 11: Illustration of the Shortfall (Contract Rate $\vee$ Expected Rate)

<table>
<thead>
<tr>
<th>Most-Senior Tranche</th>
<th>Most-Junior Tranche</th>
</tr>
</thead>
<tbody>
<tr>
<td>85%</td>
<td>65%</td>
</tr>
<tr>
<td>80%</td>
<td>70%</td>
</tr>
<tr>
<td>75%</td>
<td>75%</td>
</tr>
<tr>
<td>70%</td>
<td>80%</td>
</tr>
<tr>
<td>65%</td>
<td>85%</td>
</tr>
<tr>
<td>60%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>10.69%</td>
</tr>
<tr>
<td></td>
<td>2.73%</td>
</tr>
<tr>
<td></td>
<td>6.71%</td>
</tr>
<tr>
<td></td>
<td>1.76%</td>
</tr>
<tr>
<td></td>
<td>2.24%</td>
</tr>
<tr>
<td></td>
<td>5.06%</td>
</tr>
<tr>
<td></td>
<td>0.49%</td>
</tr>
<tr>
<td></td>
<td>1.13%</td>
</tr>
<tr>
<td></td>
<td>1.66%</td>
</tr>
<tr>
<td></td>
<td>3.92%</td>
</tr>
<tr>
<td></td>
<td>0.12%</td>
</tr>
<tr>
<td></td>
<td>0.30%</td>
</tr>
<tr>
<td></td>
<td>0.79%</td>
</tr>
<tr>
<td></td>
<td>1.27%</td>
</tr>
<tr>
<td></td>
<td>3.16%</td>
</tr>
<tr>
<td></td>
<td>0.02%</td>
</tr>
<tr>
<td></td>
<td>0.07%</td>
</tr>
<tr>
<td></td>
<td>0.21%</td>
</tr>
<tr>
<td></td>
<td>0.60%</td>
</tr>
<tr>
<td></td>
<td>1.02%</td>
</tr>
<tr>
<td></td>
<td>2.63%</td>
</tr>
</tbody>
</table>

Notes:
1) Most fund documentation is “squishy” with regard to positioning in the capital stack.
2) For non-core (or “transitional”) assets, the loan-to-value ratios can also be “squishy.”
### Returns to Debt Tranches without Liquidity

- If mezz lender lacks liquidity, it cannot protect itself upon borrower default.
- In such instance, there are no partial payments:

Exhibit 12: Illustration of Expected Returns and Riskiness by Tranche
Assuming the High-Yield Lender Has Insufficient Liquidity to Protect Its Position in a Foreclosure

<table>
<thead>
<tr>
<th>Portion of Capital Stack</th>
<th>Incremental Interest Rate</th>
<th>Incremental Payoffs</th>
<th>Cumulative Payoffs</th>
<th>Expected Return</th>
<th>Standard Deviation</th>
<th>Complete Payoff $(a)$</th>
<th>Complete Loss $(b)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>60% -- 65%</td>
<td>6.86%</td>
<td>$2.68</td>
<td>$68.34</td>
<td>6.81%</td>
<td>2.33%</td>
<td>99.95%</td>
<td>0.05%</td>
</tr>
<tr>
<td>65% -- 70%</td>
<td>7.81%</td>
<td>$2.70</td>
<td>$73.73</td>
<td>7.58%</td>
<td>4.99%</td>
<td>99.79%</td>
<td>0.21%</td>
</tr>
<tr>
<td>70% -- 75%</td>
<td>9.33%</td>
<td>$2.75</td>
<td>$79.20</td>
<td>8.44%</td>
<td>9.86%</td>
<td>99.18%</td>
<td>0.82%</td>
</tr>
<tr>
<td>75% -- 80%</td>
<td>12.00%</td>
<td>$2.82</td>
<td>$84.80</td>
<td>9.02%</td>
<td>18.02%</td>
<td>97.34%</td>
<td>2.66%</td>
</tr>
<tr>
<td>80% -- 85%</td>
<td>17.33%</td>
<td>$2.98</td>
<td>$90.67</td>
<td>8.61%</td>
<td>30.77%</td>
<td>92.57%</td>
<td>7.43%</td>
</tr>
<tr>
<td>85% -- 90%</td>
<td>30.67%</td>
<td>$3.40</td>
<td>$97.20</td>
<td>6.62%</td>
<td>50.64%</td>
<td>81.59%</td>
<td>18.41%</td>
</tr>
</tbody>
</table>

**Notes on Probability of Repayment:**

$(a) \ Prob (k_a \geq \text{Payoff})$

$(b) \ Prob (k_d = -1)$

These returns are, of course, worse than earlier illustrated

**Asset Assumptions:**

\[ k_a = 8.00\% \]

\[ \sigma_a = 12.00\% \]
A Comparison of Returns: Liquidity?

- Mezz lender lacking liquidity are expected to perform poorly!

Exhibit 13: Illustration of Risk & Return by Mezzanine Tranche
Assuming with and without Lender (or Fund) Liquidity

We should remind ourselves that liquidity (e.g., cash on hand, lines of credit, etc.) is not costless – those costs are not considered here!

This also suggests that “loan-to-own” strategies are costly (and potentially difficult) to execute!

Given borrower’s default and certain fixed costs of recovery, these problems may worsen with “thin” tranches.
Mezz/High-Yield Debt: Agenda

► Context & Motivation:
  ▪ Fund-raising activities
  ▪ Low-return environment/high prices
  ▪ Lenders’ capital restrictions

► Mezz Mechanics:
  ▪ The credit curve as a $f$(leverage)
  ▪ Asset-level volatility $\rightarrow$ default risk
  ▪ A first look at expected returns & volatility (mezz tranche)

► Mezz Nuances:
  ▪ Mezz debt & levered loans
  ▪ Mezz debt without sufficient lender liquidity

► Mezz v. Equity Returns:
  ▪ Expected returns & volatility
  ▪ Bounded (mezz) returns v. unbounded (equity) returns
At first blush, it may seem that mezz is superior to levered equity.

But not so fast!
Comparing Mezz & Equity Returns

- Mezz returns are senior to equity, but are bounded.
- Equity returns are subordinated to mezz, but are unbounded.

Exhibit 15: Illustration of Payoff Regions to Junior-Most Mezzanine Tranche and Levered Equity
Comparing Mezz & Equity Returns

- Mezz returns are senior to equity, but are bounded.
- Equity returns are subordinated to mezz, but are unbounded.

![Exhibit 15: Illustration of Payoff Regions to Junior-Most Mezzanine Tranche and Levered Equity](image-url)

- Distribution of Asset-Level Returns
- Realized Mezz Returns
- Asset Returns
- Senior Tranche(s)
- 85% LTV
- Levered Equity

<table>
<thead>
<tr>
<th>Asset Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>-100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Debit and Equity Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>-100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency of Asset-Level Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>-28%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Debt and Equity Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>-100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency of Asset-Level Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>-28%</td>
</tr>
</tbody>
</table>
Comparing Mezz & Equity Returns

- Mezz returns are senior to equity, but are bounded.
- Equity returns are subordinated to mezz, but are unbounded.

Exhibit 15: Illustration of Payoff Regions to Junior-Most Mezzanine Tranche and Levered Equity

Comparing Mezz & Equity Returns

- Mezz returns are senior to equity, but are bounded.
- Equity returns are subordinated to mezz, but are unbounded.
Another Look at Bounded Mezz Returns

Exhibit 16: Illustration of Payoff Regions to Junior-Most Mezzanine Tranche and Levered Equity

Distribution of Asset-Level Returns

- Expected Return to Mezzanine Tranche
- 85% LTV
- Senior Tranche(s)
- Levered Equity

Realized Mezz Returns | Asset Returns
Realized (Levered) Equity Returns | Asset Returns

Frequency of Asset-Level Returns

-28% -22% -16% -10% -4% 0% 4% 8% 12% 16% 20% 24% 28% 32% 36% 40% 44%

Debt and Equity Returns

-250% -225% -175% -150% -125% -100% -75% -50% -25% 0% 25% 50% 75% 100% 125% 150% 175% 200% 225% 250%
Another Look at Bounded Mezz Returns

Exhibit 16: Illustration of Payoff Regions to Junior-Most Mezzanine Tranche and Levered Equity

This portion of the distribution is unattainable!

So, $\sigma_d$ is an imperfect measure

Expected Return to Mezzanine Tranche

Senior Tranche(s)

Levered Equity

85% LTV

Realized Mezz Returns | Asset Returns

Realized (Levered) Equity Returns | Asset Returns

Distribution of Asset-Level Returns

Frequency of Asset-Level Returns

Debt and Equity Returns

-28%  -22%  -16%  -10%  -4%  2%  8%  14%  20%  26%  32%  38%  44%

0%   -25%  -50%  -75%  -100%  -75%  -50%  -25%  0%  25%  50%  75%  100%

-25%  0%   25%  50%  75%  100%  125%  150%  175%  200%  225%  250%
Concluding Remarks

• Given the lack of empirical evidence, we take an equilibrium approach:
  – 1) cost of debt ($k_d$) tied to asset’s $\theta E[k_a] (=f(\sigma_a))$, and
  – 2) cost debt ($k_d$) of increases geometrically with $LTV$.\[ k_d = r_f + \gamma + \delta \frac{LTV}{1-LTV} \]

• The non-recourse borrower has bought a put option from the lender – it is reflected in the default premium ($\delta$) charged by the lender.

• Given asset-level volatility ($\sigma_a$), the expected shortfall between the lender’s contract interest rate ($k_d$) and the expected rate of return {$E(k_d)$} widens with the most-junior tranches.

• Because of the bounded (near-binary) nature of the lender’s return, the standard deviation of the lender’s return ($\sigma_d$) is an imperfect measure.

• Notwithstanding the criticism above, the risk-return characteristics of mezz ($E[k_d], \sigma_d$) look quite similar to levered equity ($E[k_e], \sigma_e$).
Concluding Remarks (continued)

• These main conclusions are tempered by a host of nuances & complications:
  – mezz “debt” which is really equity,
  – mezz tranches of different sizes and positions within the capital stack,
  – the expected shortfall \( [k_d - E(k_d)] \) can vastly differ for different positions within the capital stack, even when those positions supply the same amount of capital,
  – whether the mezz debt is covenant-light or -heavy,
  – whether the mezz lender has sufficient liquidity to protect its position upon the borrower’s default (while not incorporated into these analyses, this liquidity is not costless),
  – given borrower’s default, thin (or narrow) tranches may not be worth fighting for,
  – the levered loan strategies ought, in principle, to perform like a more-narrow, “pure” mezz lending strategy, but
  – the levered-loan strategies use, by necessity, cross-collateralized and -defaulted fund-level borrowings, which adds substantially to the riskiness of the fund’s returns, and
  – the LPs’ bounded (or truncated) returns can be significantly diluted by the GP’s base and incentive fees.