The Market with Negative Expected Return: Shrouded Fees and Ex-Post Returns of High Yield Structured Products

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Motivation
- Banks engineer complex yield enhancement products that offer high yield in exchange for high risk and hidden embedded fee
- Targeted at non-accredited households
- Numerous SEC and FINRA charges: misleading investors, unsuitable sales
- 2015 SEC examination: aggressive sales to elderly, conservative, and non-English speaking investors
- ~ $20 billion annual volumes

What are the product expected returns and shrouded fees?

Security design
- Term: 3 months
- Headline rate: 14% pa (3.50% in 3m)
- Linked to stock of Ubiquiti Networks
- Downside protection up to 30% barrier
- Issuer: J.P. Morgan
- Estimated value: 96.17%
- Implied annual fee: 15.32%
- Expected return: -2.65% (97.35%)

Data and translation algorithm
- Commercial data platform with comprehensive coverage: 2006 - 2015
- Rich heterogeneity in product payoffs and exotic features
- I develop a textual algorithm to translate payoff description into a mathematical formula
- Which allows for the first time to estimate product fair values, expected returns, and ex-post returns for the market (>80% coverage)

Summary stats

<table>
<thead>
<tr>
<th>Summary stats</th>
<th>Mean Volume weighted</th>
<th>SD 25pctl</th>
<th>75pctl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected term</td>
<td>0.05</td>
<td>0.66</td>
<td>0.32</td>
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<tr>
<td>Headline rate</td>
<td>13.01</td>
<td>12.04</td>
<td>4.70</td>
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<tr>
<td>Implied σ</td>
<td>46.06</td>
<td>42.30</td>
<td>13.24</td>
</tr>
<tr>
<td>Δ₀</td>
<td>0.42</td>
<td>0.42</td>
<td>0.05</td>
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<tr>
<td>βₜ</td>
<td>1.64</td>
<td>1.59</td>
<td>0.77</td>
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N = 22,240

Valuation
- Standard approach based on the Black-Scholes-Merton framework
- Fixed-term products decomposed into bond and options:
  - European, barrier, digital, or asset-or-nothing → analytic solution
  - Products with discrete call dates:
  - Estimate joint risk-neutral probabilities of early calls and coupon payments
  - Calculate present value of expected cash-flows
  - Implied volatility from Option Metrics: bi-linearly interpolated from four options with the nearest maturity and strike price

Estimated value and expected returns

Main result: Widespread issuance of products with negative expected return under plausible assumptions

Average value 96% or 7.37% annual embedded fee

For E(R) assuming: dSₜ = μSₜdt + σSₜdWₜ, μ = r + 0.06βₜ

Ex-post returns

Benchmark = delta equivalent return from dynamically adjusted position in risk-free rate and the underlying stock:

rₜ = r + Δₜₜ(rₜ,ₜ - rₜ)

Benchmark and abnormal returns

Widespread issuance of products targeted at unsophisticated households with shrouded fees large enough that their expected returns are negative

On average, investors paid 7.37% in hidden fees and lost 4.92% in raw and 6.39% in abnormal returns annually

Conclusion