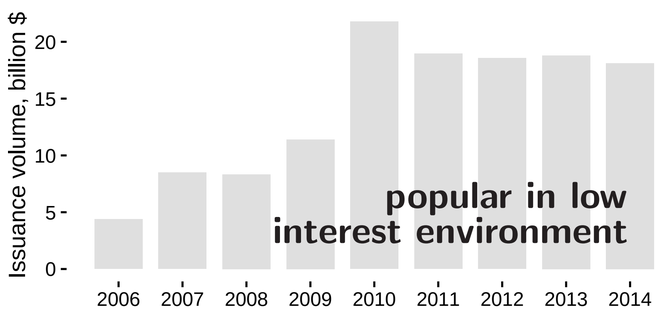
The Market with Negative Expected Return:
Shrouded Fees and Ex-Post Returns of High Yield Structured Products

Petra Vokata
Aalto University School of Business

Aalto University

Motivation

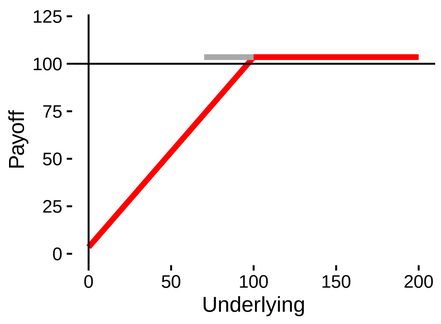
- Banks engineer complex yield enhancement products that offer high yield
  - in exchange for high risk
  - and hidden embedded fee
- Targeted at non-accredited households
  - numerous SEC and FINRA charges: misleading investors, unsuitable sales
  - 2015 SEC examination: aggressive sales to elderly,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



What are the product expected returns and shrouded fees?

Security design

Product example:



- 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	Mean	Volume weighted	SD	25pctl	75pctl
Expected term (yrs)	0.55	**0.66**	0.32	0.26	0.98
Headline rate (%)	13.01	**12.04**	4.70	10.00	15.10
Implied σ	46.06	**42.30**	13.24	37.34	52.12
$\mathbf{\Delta_0}$	0.42	**0.42**	0.05	0.39	0.45
β_S	1.64	**1.59**	0.77	1.15	2.04

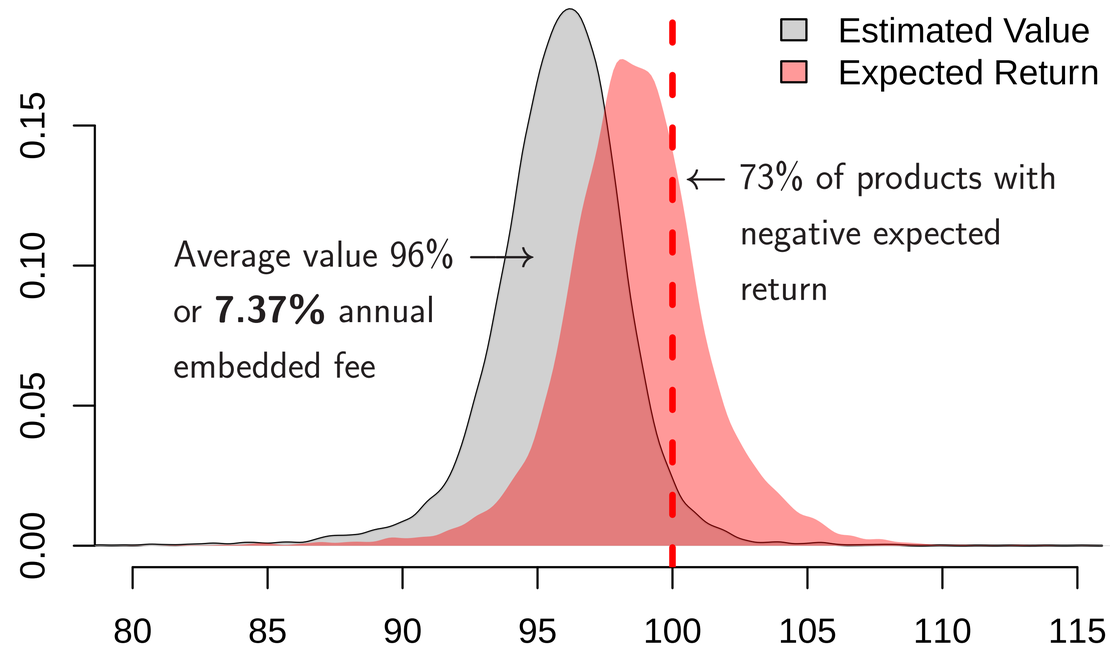
N = 22,240

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 $\longrightarrow$ 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

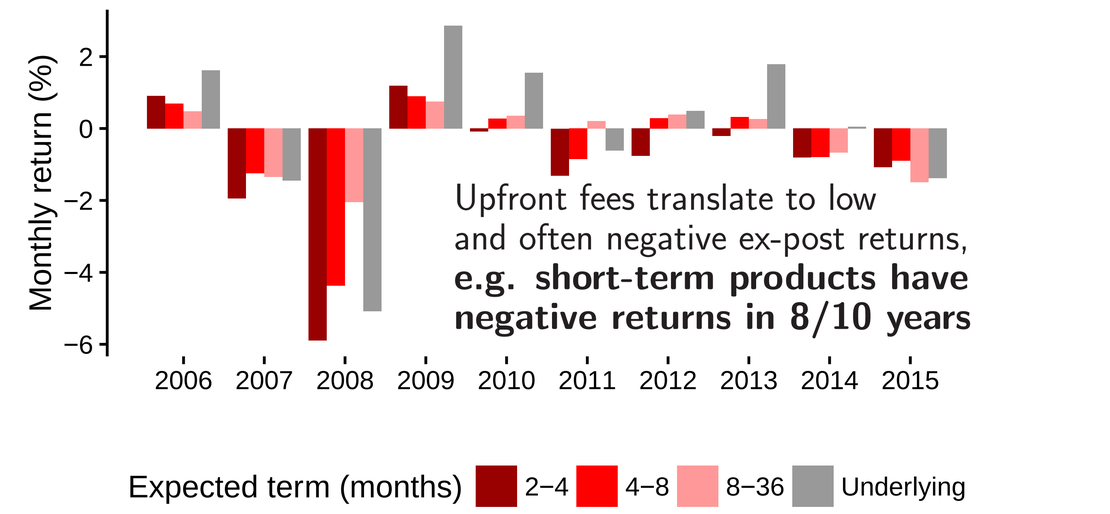
Estimated value and expected returns

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



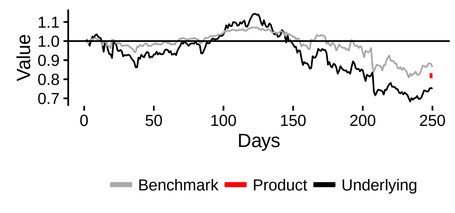
For $\mathbb{E}(R)$ assuming: $dS_t = \mu S_t dt + \sigma S_t dW_t, \mu = r + \mathbf{0.06}\beta_S$

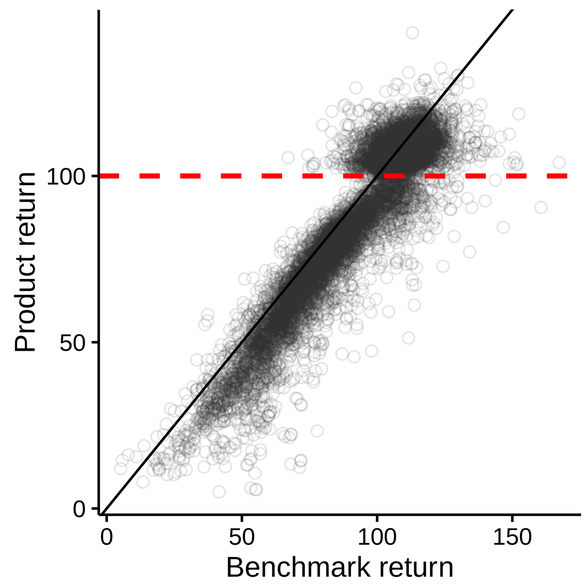
Ex-post returns



Benchmark and abnormal returns

Benchmark = delta equivalent return from dynamically adjusted position in risk-free rate and the underlying stock:
$r^b_{i,t} = r_t + \mathbf{\Delta}_{i,t}(r_{s,t} - r_t)$,
$\mathbf{\Delta}_{i,t}(S_t, \sigma_t, r_t) = \frac{\partial v_{i,t}}{\partial S_t}$





Results	Mean	Volume weighted	SD	25pctl	75pctl
Fee	9.25	**7.37**	6.75	4.99	12.00
Expected return	-3.77	**-1.99**	6.53	-6.50	0.16
Ex-post return	-2.99	**-4.92**	30.15	-10.12	13.85
Benchmark return	5.01	**1.58**	33.07	-2.67	22.01
Abnormal return	-7.41	**-6.39**	13.65	-12.75	-0.64

N = 22,240

Conclusion

- 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