INDEX OPTIONS REALIZED RETURNS DISTRIBUTION FROM PASSIVE INVESTMENT STRATEGIES

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Overview

- Past Literature
- Options investment as an insurance company
- Proposed methodology and Data Inputs
- Data Analysis
- Conclusions

Past Literature

- It's not a valuation problem (~~Black-Scholes; more complex arbitrage-free models~~…)

- It's a problem of returns on passive investment strategies (holding options until expiration),
  - *Benesh and Crompton* (2000): historical return distribution for calls, puts and covered calls from 1986 to 1989. Holding period: 12 weeks. Extreme risks and potentially large rewards associated with *purchase* of both call and put options.
  - *Summa* (2003): Options held until expiration. Option sellers come out ahead even when market trend is going against their view.
  - *Coval and Shumway* (2000): Call option returns exceeding those of the underlying security and put option returns being below the risk-free rate.

Options Investment as an Insurance Company

- Selling options is similar to selling insurance, i.e. *car insurance business*.

- Right question to make is: *How do you calculate the P&L?*
  - Usual way: return on an option position relative to an actual portfolio, i.e. write a put and hold the strike price in cash, or write the call and buy the underlying stock.
  - **Alternative way**: think of margins.

Proposed Methodology and Data Inputs

- Based on Chicago Board Options Exchange (CBOE) Rulebook (CHAPTER XII – Margins) calculations.
  - Establishes guidelines for both initial and maintenance requirements on margin accounts, when selling “naked” options.
  - In our specific case, we stick to broad based indices[1]

[1]Really nice discussion on whether the right word is indices or indexes (for the plural of index): http://www.nasdaqomx.com/transactions/indexes/indexesorindices/

Proposed Methodology and Data Inputs

- Given the margin, we calculate the Internal Rate of Return (IRR) for a given option, based on different margin metrics,
  - ✓For call options

$$IRR_i^k = \frac{c_i - \left(S_T^i - K_i\right)_+}{Margin_i^k}$$

  - ✓For put options

$$IRR_i^k = \frac{p_i - \left(K_i - S_T^i\right)_+}{Margin_i^k}$$

Proposed Methodology and Data Inputs

- Where the margin can take up three different forms:

$$Margin_i^k \in \{\overline{Margin}, Margin_{initial}, Margin_{max}\}$$

- Finally, we annualize our IRR, by scaling up the period of time until one year, getting as a result an arithmetic annual rate (for comparison's sake):

$$Annual\ IRR_i^k = IRR_i^k \times \frac{365}{T}$$

Proposed Methodology and Data Inputs

- Used data:
  - Daily options prices from *OptionMetrics*, ranging from January 1996 until July 2013.
  - Indices: Dow Jones Industrial Average, the Standard and Poor's 500 and the Nasdaq 100.
  - Near at-the-money (ATM) naked call and put options. Moneyness degree between 0.95 and 1.05.
  - Maturities: around 60, 180 and 365 days (filters were applied to get a range of dates)
  - More than 10 trading days.

- Universe: around 470.000 observations.

Data Analysis

- By holding them passively until expiration, our results draw general conclusions in line with previous papers,
  - ✓Selling put options have a greater payoff than selling calls, as well as selling shorter maturities yield a better payoff than longer maturities.
  - ✓It's striking that, despite going "against the tide" (markets *natural* drift), selling call options in a passive way still yields a positive return (increasing as a function of time –though median turns negative-).
  - ✓Volatility (as well as higher moments in the returns distribution) is an issue.

Data Analysis

- Direct results (with initial margin):

Call Option Summary Statistics

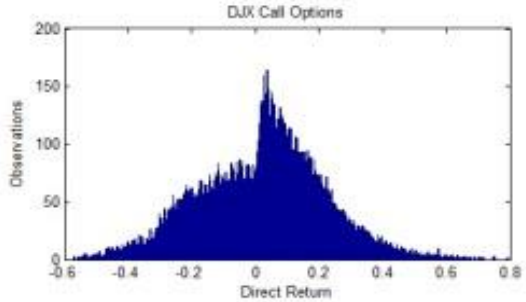
TTM	**60 days**	**180 days**	**365 days**
Mean	0,0170	0,0278	0,0482
Median	0,0376	0,0133	-0,0607
Standard Deviation	0,2347	0,3965	0,4557
Max	1,1649	1,7871	1,4633
Min	-0,9308	-2,0958	-0,9611
Kurtosis	3,8049	3,7521	2,2851
Skewness	-0,1195	0,0704	0,5031
Average Moneyness	0,9997	0,9999	0,9997
Average TTM	59,37	183,11	347,86
Observations	137.759	64.782	31.970
Period	Jan-96 / Jul-13	Jan-96 / Feb-13	Jan-96 / Sep-12
Daily observations			

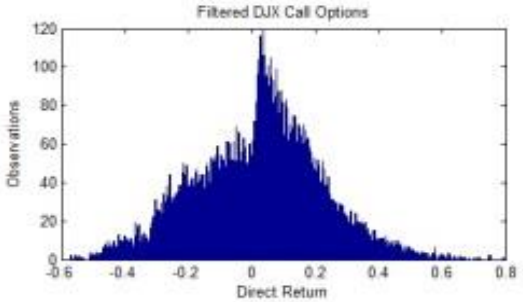
Put Option Summary Statistics

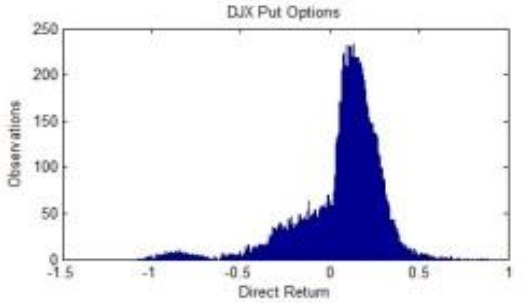
TTM	**60 days**	**180 days**	**365 days**
Mean	0,0870	0,2162	0,2332
Median	0,1369	0,2907	0,3513
Standard Deviation	0,2475	0,3634	0,4646
Max	0,9288	1,2166	1,3094
Min	-1,1600	-1,6267	-1,1102
Kurtosis	7,0743	5,3447	3,6226
Skewness	-1,6281	-1,4860	-1,1449
Average Moneyness	0,9995	0,9997	0,9997
Average TTM	59,37	182,96	347,85
Observations	137.963	65.451	31.959
Period	Jan-96 / Jul-13	Jan-96 / Feb-13	Jan-96 / Sep-12
Daily observations			

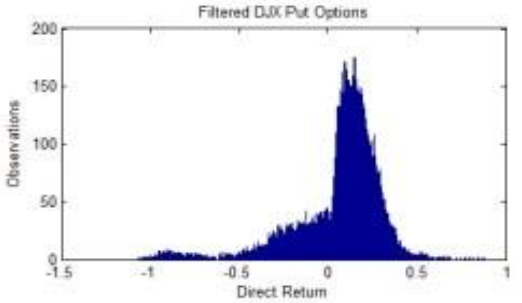
Data Analysis

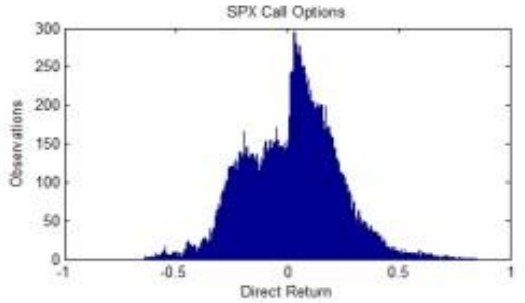
- Histogram for 60-day filtered options, by index (average margin considered):

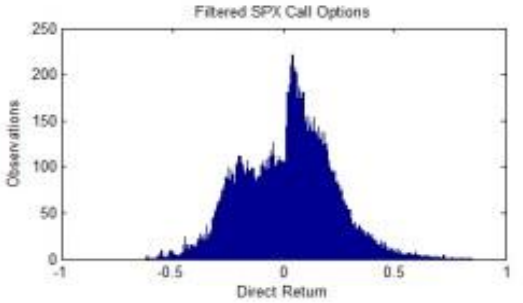


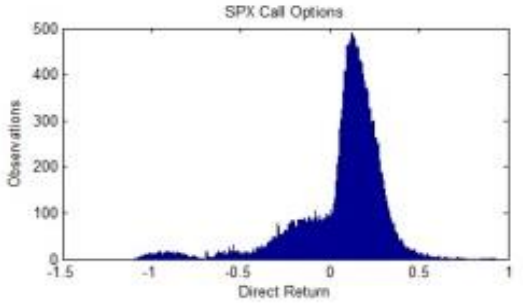


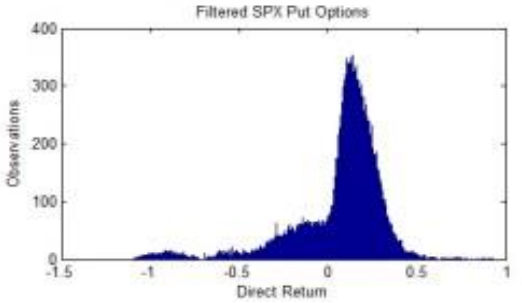


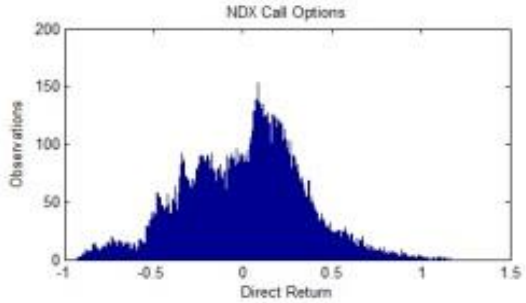


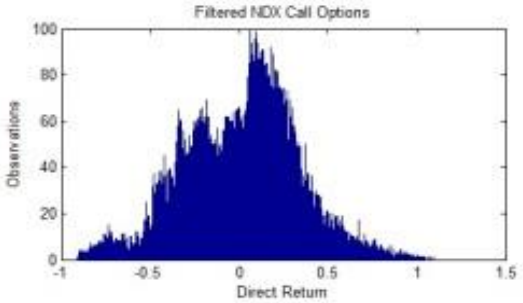


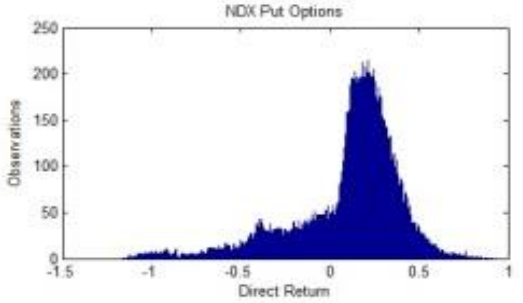


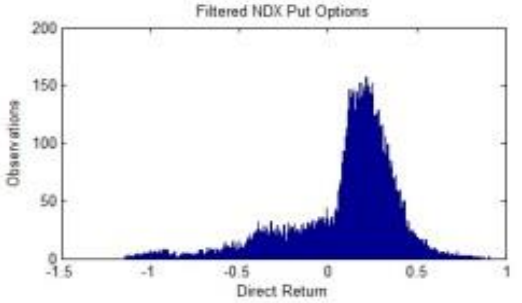








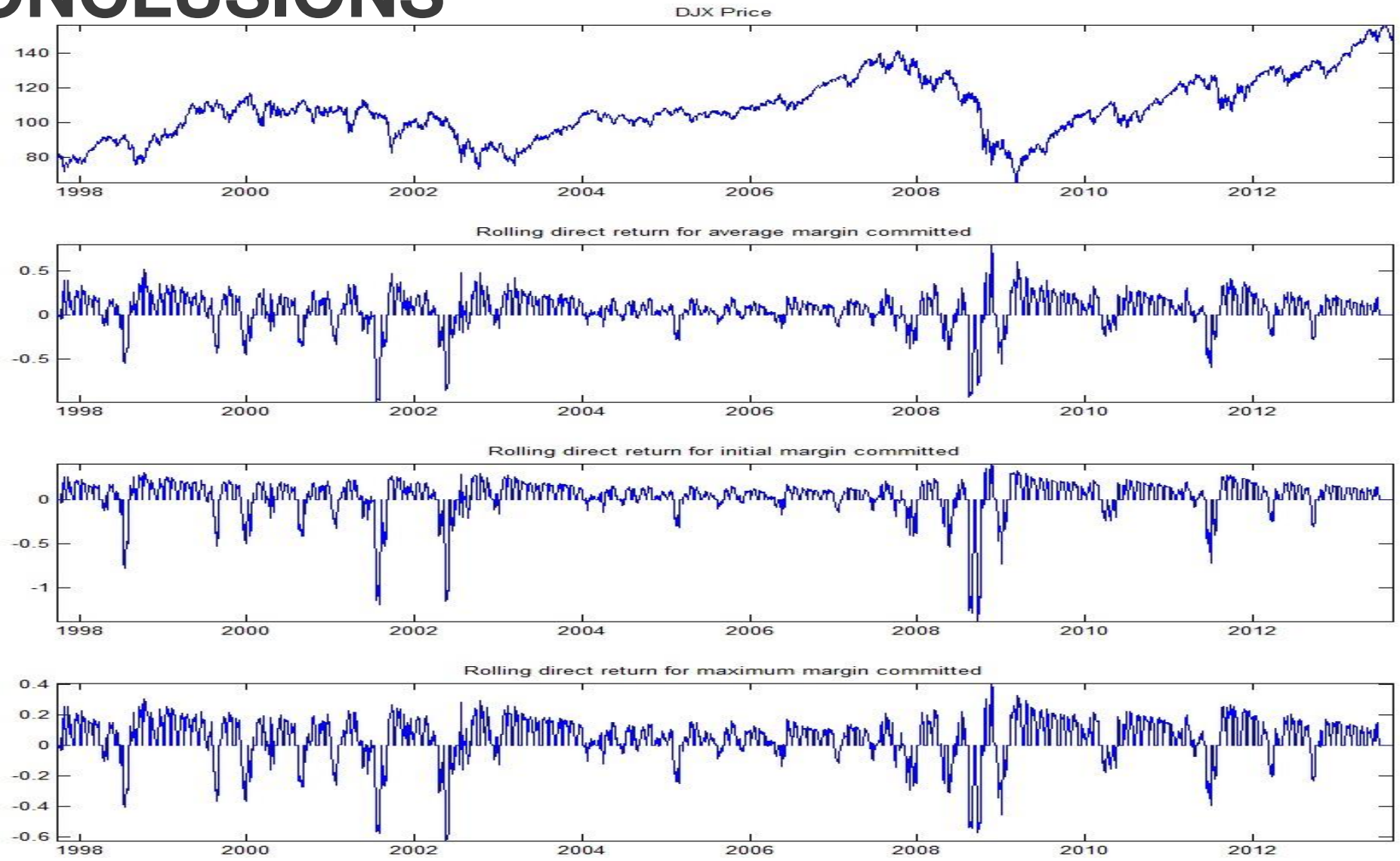




Conclusions

- Extensions:
  - ✓Link returns outcome with factors driving the risk premia? Suggestions welcome
  - ✓Straightforward active strategies: move from a passive approach into an active one,
    - Risk management control;
    - Regime identification dominating trading approach;
    - Filtering approach? Derivations from *technical analysis*.

CONCLUSIONS



THANK YOU!