Replicating Hedge Fund-Like Mutual Fund Strategies using Eurex products

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eurex

About research

- Research conducted by QFRG Group:
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About research

- Objective:
  to check whether the incorporation of the derivatives traded on Eurex Exchange into the portfolios of hedge-fund like mutual funds can provide the enhancement of their risk/return characteristics

- Two stages of the project:
  - performance attribution of hedge fund-like mutual funds
  - Study of diversification benefits that come from extending extracted asset classes with derivatives traded on Eurex Exchange

Rationale in literature

- Why replicate?
- To analyze the exposure of mutual funds' portfolios to common asset classes without going into detailed information coming from fund's internal sources
- Benchmarks representing asset classes can be more liquid than investment in fund
- transaction costs connected with such investments should be much lower than fees charged by funds
- Some groups of investors are not allowed to invest in hedge funds, while replicating asset classes lies in their investment spectrum

- rough attribution of fund's exposure to common risk factors rather than a vehicle performing a "reverse-engineering" of manager's strategy

Methodology

- multi-factor portfolio performance attribution tehnique was used
- Framework based on APT model
- Analysis aggregated on portfolio level
- Exposures estimated with OLS

$$R_t = \alpha + \beta_1 F_{1,t} + \ldots + \beta_n F_{n,t} + \varepsilon_t$$

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Methodology

- Markowitz model
- Assessment of the usefulness of derivatives traded on the Eurex Exchange measured by improvement in the risk/return characteristics
- Estimation of efficient frontiers before and after addidtion of particular derivatives

Methodology

- Calculation repeated for each funds group and for each examined Eurex futures
- Weights constrained on interval [-2,2] in order to include short positions and leverage effect.
- Measures:
  - overall improvement of efficient frontier – an indicator that measures the average percentage reduction of risk for corresponding levels of return.
  - Sharpe ratio

Data

- six categories of hedge fund-like mutual funds
  - Multi strategy
  - Managed Futures
  - Long/Short
  - Fund of Funds
  - Emerging Markets
  - Dedicated Short Bias
- Particular funds assigned to groups based on reputable sources (e.g. Bloomberg, Reuters, Morningstar)
- Historical funds valuations collected from wikiposit.org
- dataset with almost 200 mutual funds with prices since at least the beginning of 2008.

Data - initial set of asset classes

#	Asset class	Index name
1	US Equity	MSCI USA Index (total return - gross)
2	Non US Equity	MSCI World Index Excluding US (developed markets)
3	Europe Equity	MSCI Europe Index (total return - gross)
4	US Large Cap	MSCI USA Large Cap Index (total return - gross)
5	US Small Cap	MSCI USA Small Cap Index (total return - gross)
6	EAFE	MSCI EAFE Index (Europe, Australasia, Far East)
7	EM	MSCI Emerging Markets Index (total return - gross)
8	EM Europe	MSCI Emerging Markets Europe Index (total return - gross)
9	EM Asia	MSCI Emerging Markets Asia Index (total return - gross)
10	EM Latin America	MSCI Emerging Markets Latin America Index (total return - gross)
11	US Gov Bond	Barclays US Treasury Bond Index (all maturities)
12	UK Gov Bond	Barclays UK Gilt Index (all maturities)
13	Euro Gov Bond	Barclays Euro Government Bond Index (all maturities)
14	US Corp Bond BBB	BofA Merrill Lynch US Corp BBB Total Return Index Value
15	US Corp Bond High Yield	BofA Merrill Lynch US High Yield Master II Total Return Index Value
16	Commodity	Thomson Reuters/Jefferies CRB Index - Total Return Series
17	VIX Futures	Linked contract time-series of CBOE Volatility Index Futures rolled on Open Interest
18	Currency	Trade Weighted U.S. Dollar Index Major Currencies
19	Credit BBB	BofA Merrill Lynch US Corporate BBB Option-Adjusted Spread
20	Credit High Yield	BofA Merrill Lynch US High Yield Master II Option-Adjusted Spread

Data – Eurex Derivatives

- Five time-series of the linked futures contracts have been analyzed:
  - FDAX (DAX index futures)
  - FVS (VSTOXX mini futures)
  - FESB (EURO STOXX Banks futures)
  - FESX (EURO STOXX 50 Index futures)
  - FGBL (Euro-Bund futures)
- Linked futures contracts was generated using self-developed algorithm and data obtained from Eurex Exchange
- Daily prices from January 2008 through December 2011 were used

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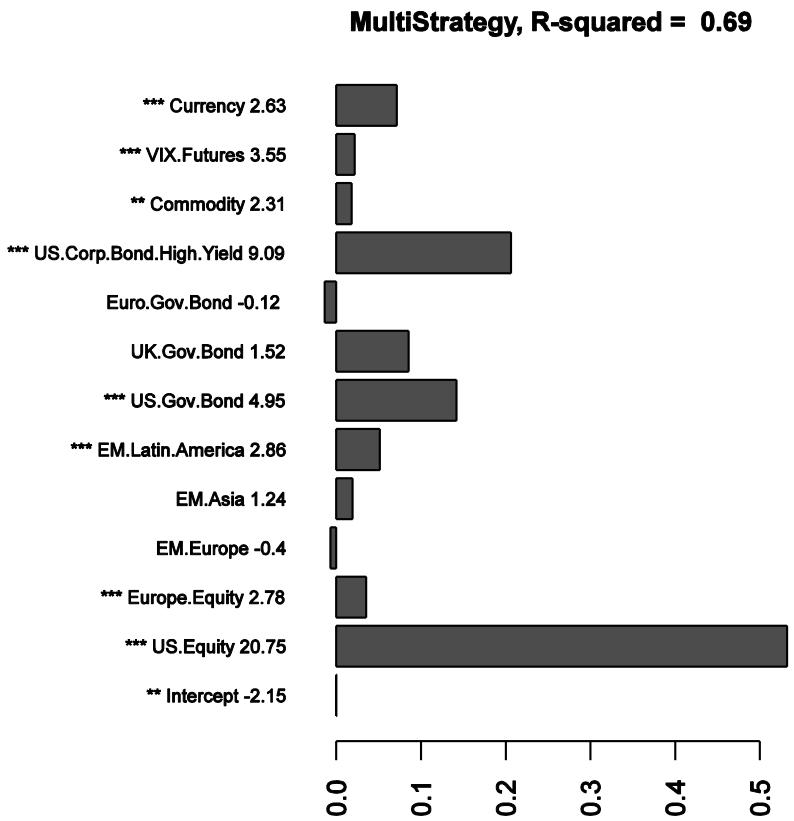
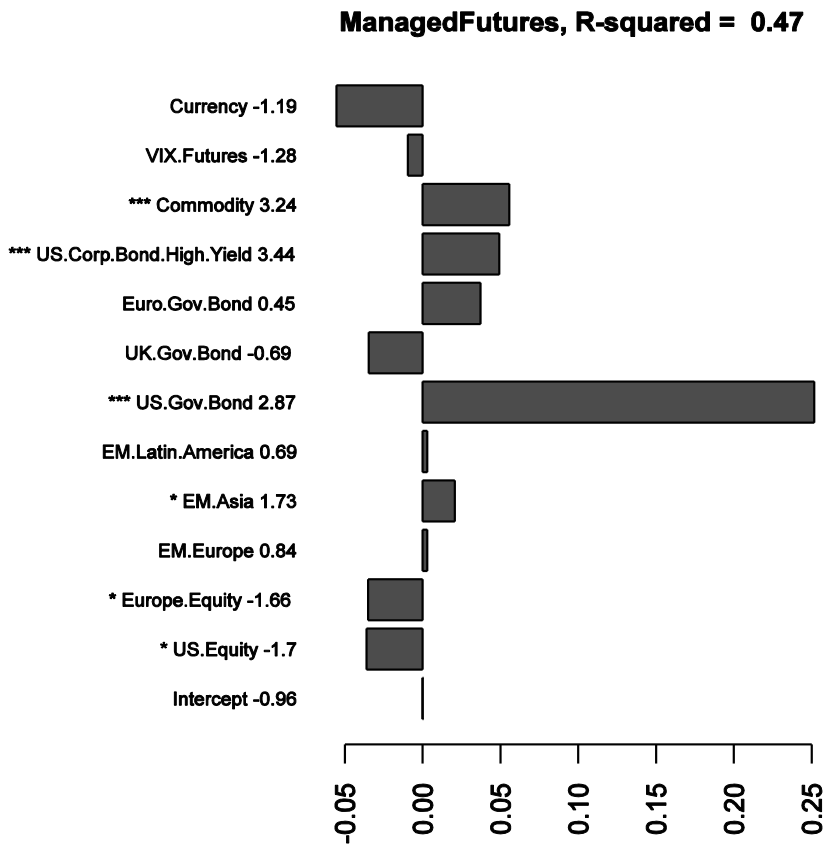
Results of the performance attribution(1)





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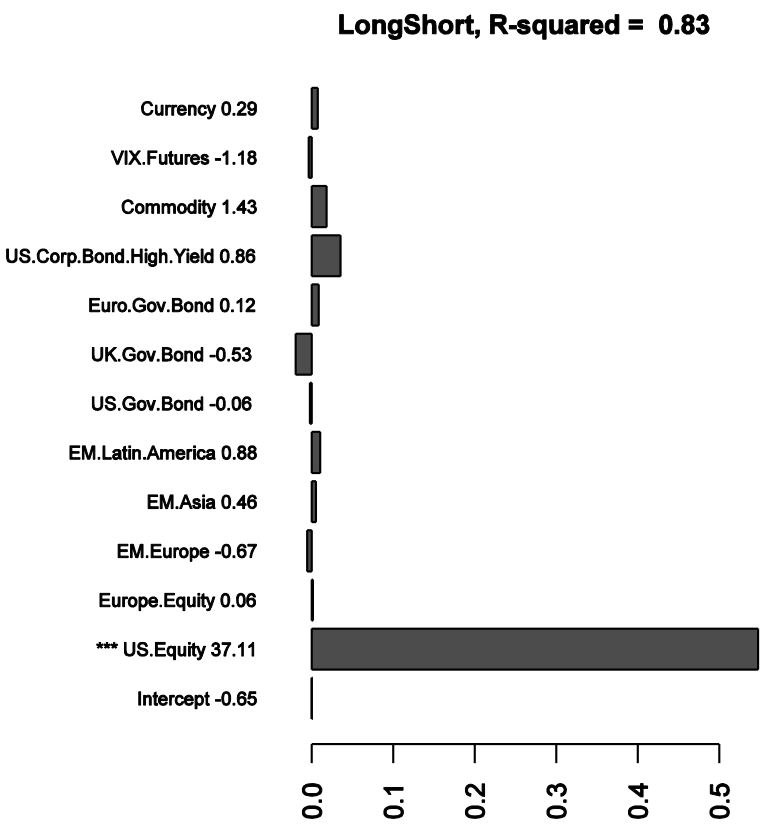
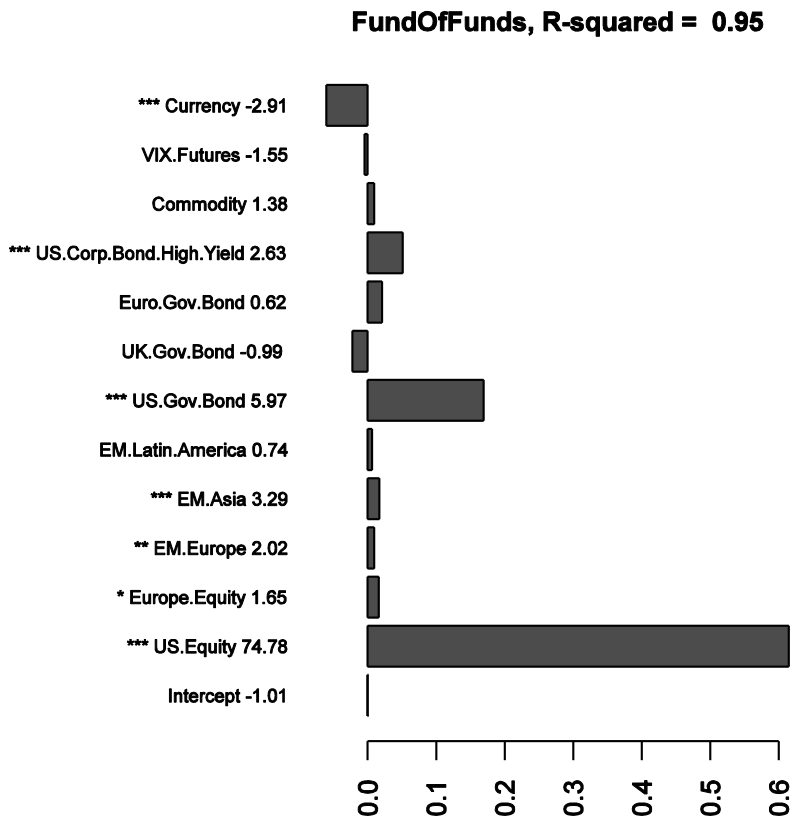
Results of the performance attribution(2)





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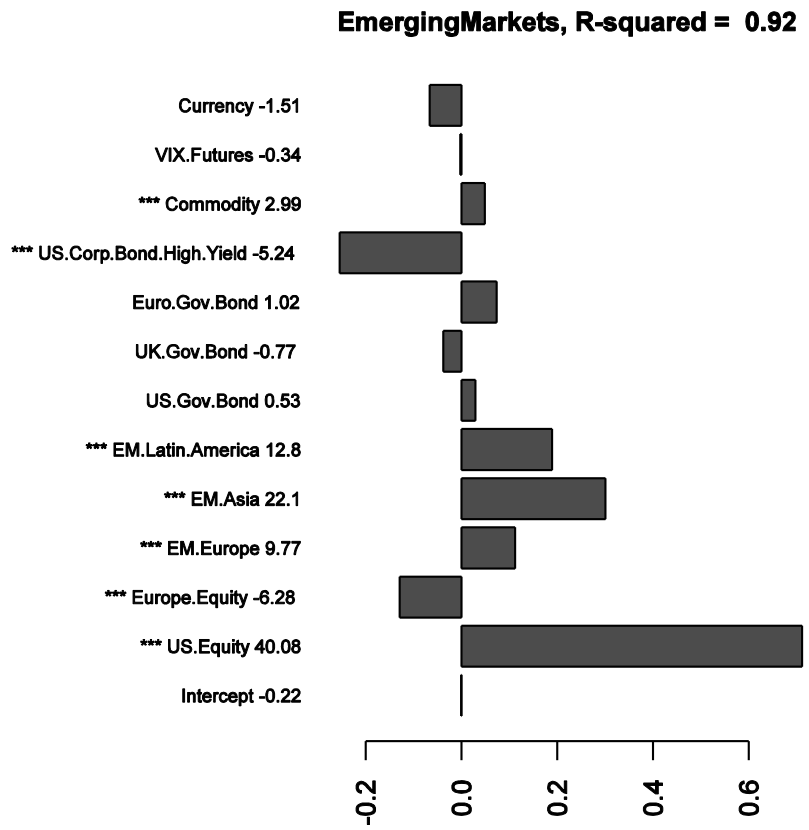
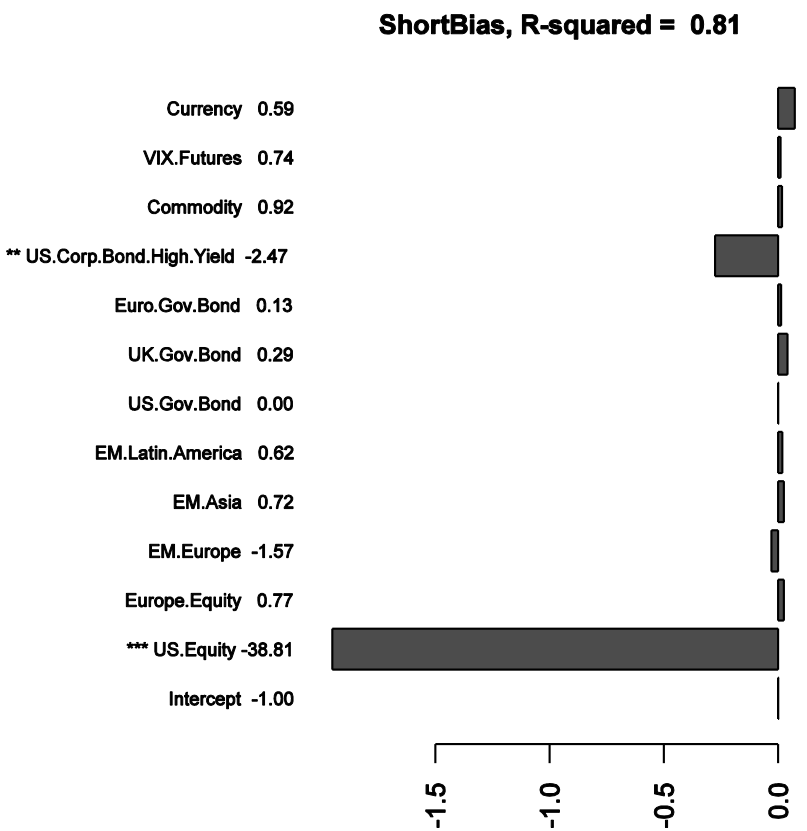
Results of the performance attribution(3)





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Simplified output of performance attribution

Asset class	Multi-Strategy	Managed-Futures	Long-Short	Fund-Of-Funds	Emerging-Markets	Short-Bias
US.Equity	■	■	■	■	■	■
Europe.Equity	■	■		■	■	
EM.Europe				■	■	
EM.Asia		■		■	■	
EM.Latin.America	■				■	
US.Gov.Bond	■	■		■		
UK.Gov.Bond						
Euro.Gov.Bond						
US.Corp.Bond.High.Yield	■	■		■	■	■
Commodity	■	■			■	
VIX.Futures	■					
Currency	■			■		

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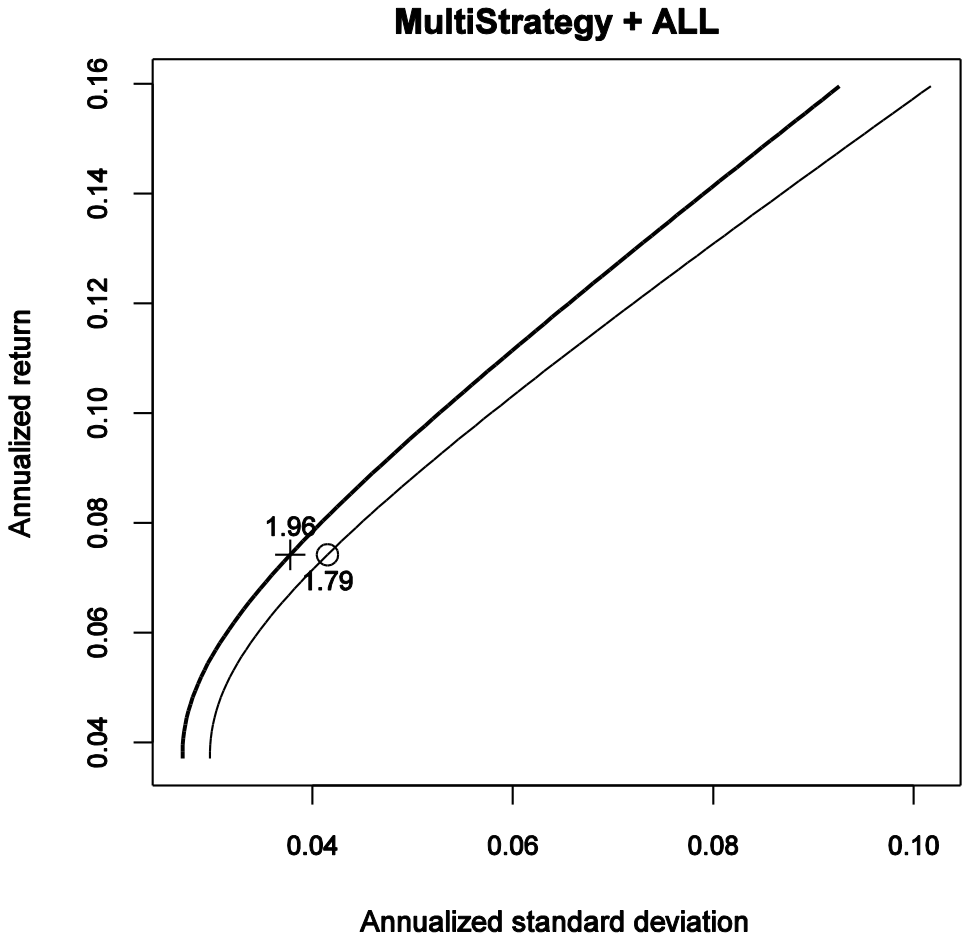
Markowitz portfolio optimization (1)



- **Overall improvement of efficient frontier:** 8,96%
- **Improvement of maximum Sharpe ratio:** 9,82%

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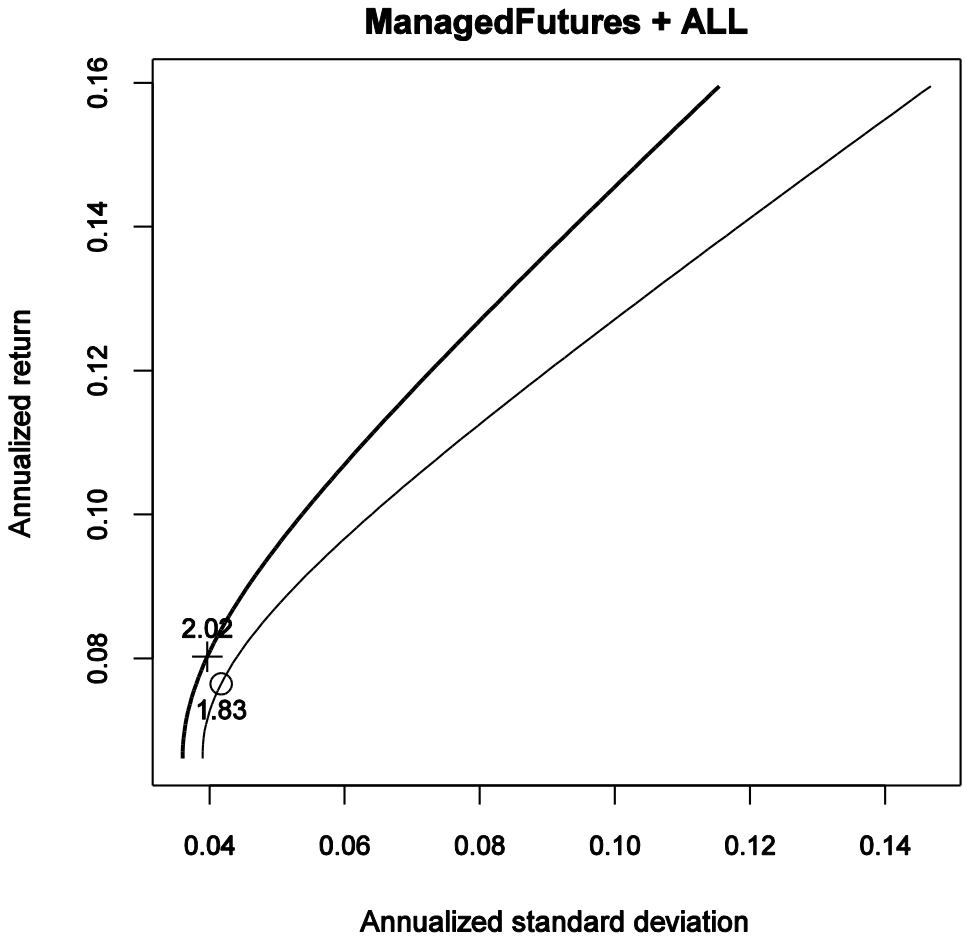
Markowitz portfolio optimization (2)



- **Overall improvement of efficient frontier:** 16.51%
- **Improvement of maximum Sharpe ratio:** 10.35%

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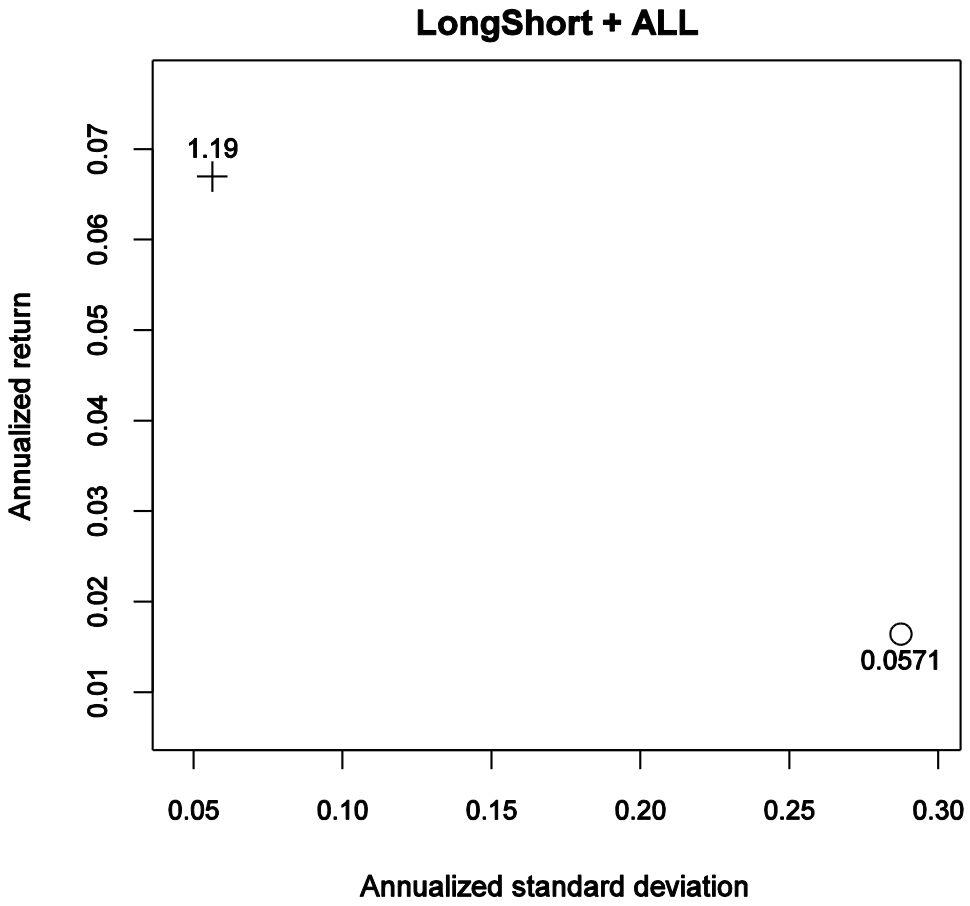
Markowitz portfolio optimization (3)



- **Improvement of maximum Sharpe ratio:** 1982.84%

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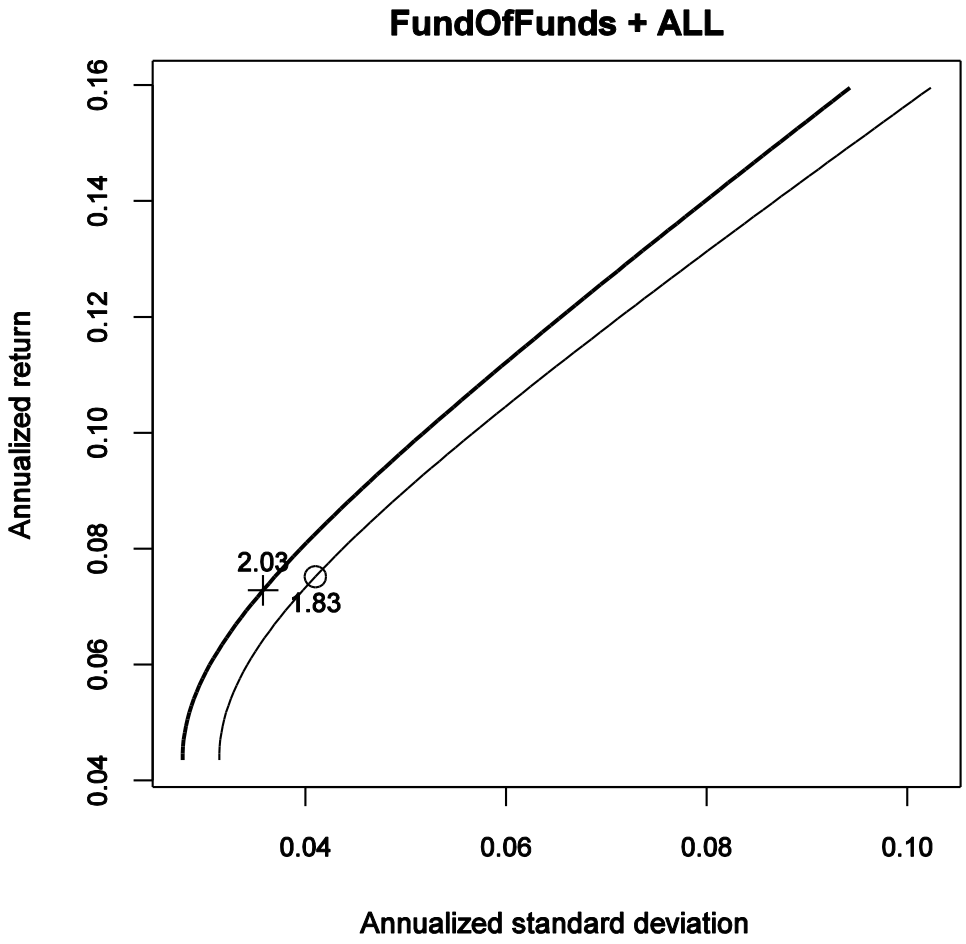
Markowitz portfolio optimization (4)



- **Overall improvement of efficient frontier:** 9.14%
- **Improvement of maximum Sharpe ratio:** 10.97%

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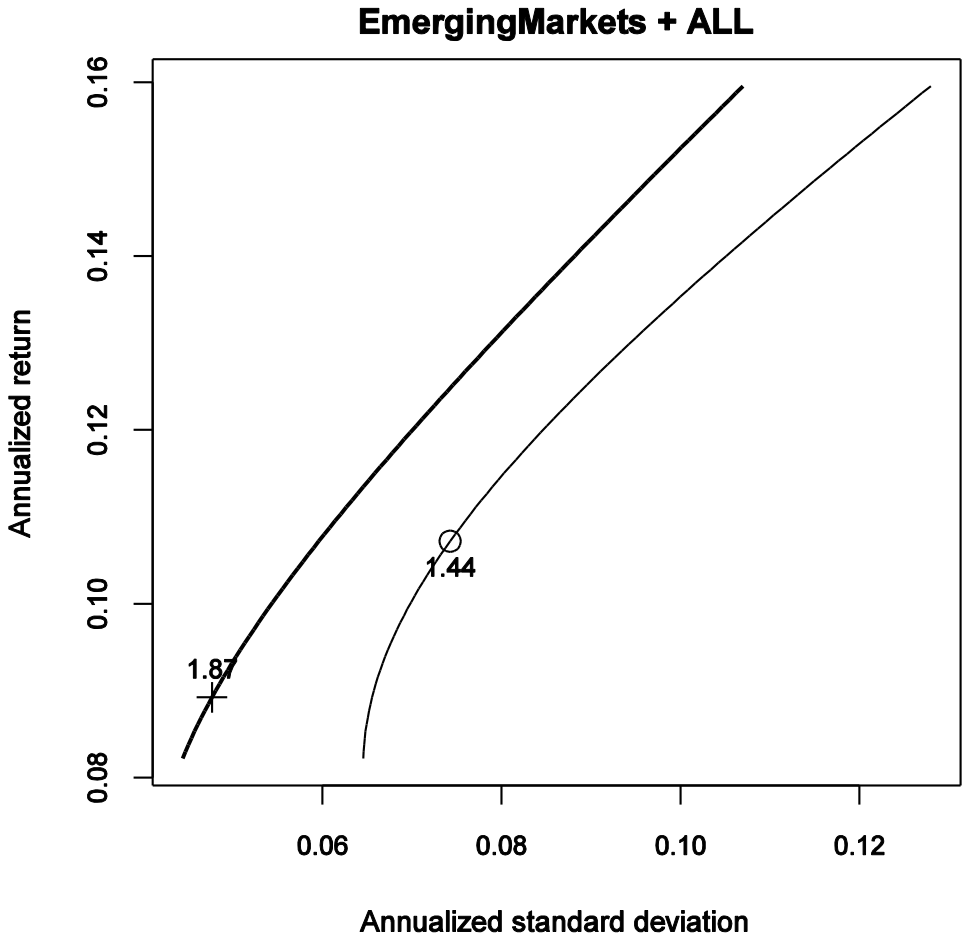
Markowitz portfolio optimization (5)



- **Overall improvement of efficient frontier:** 19.47%
- **Improvement of maximum Sharpe ratio:** 29.73%

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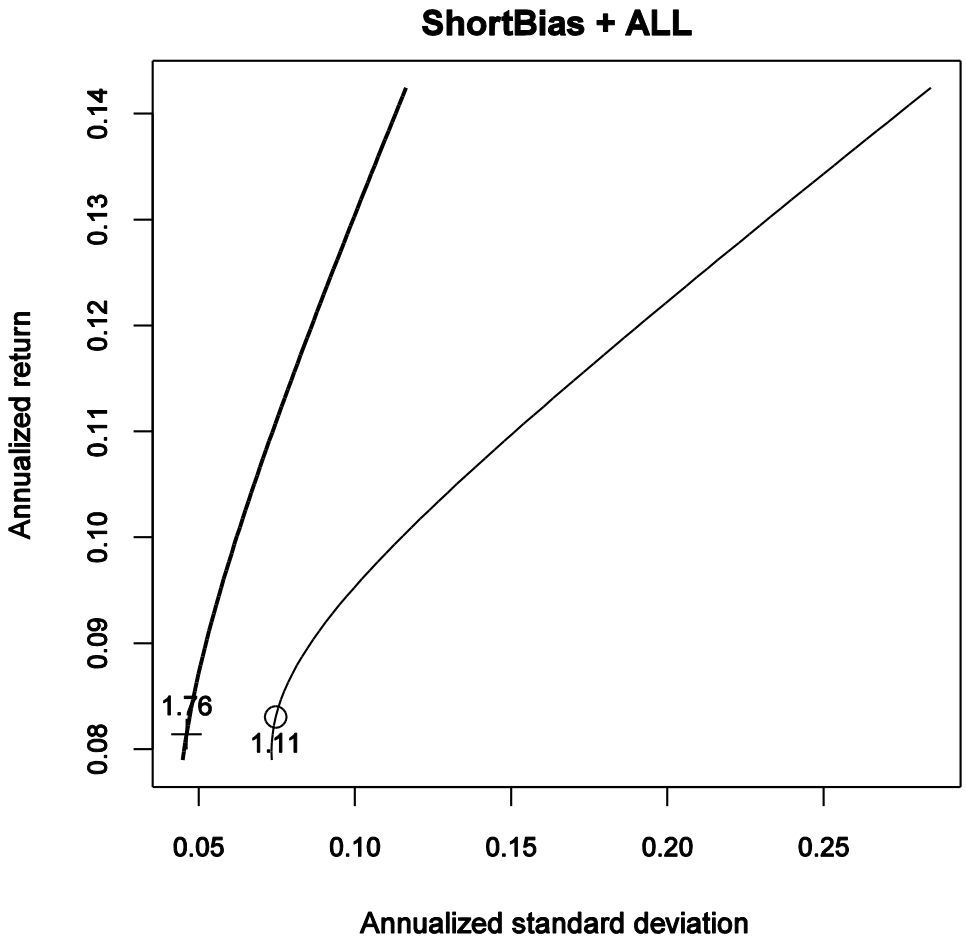
Markowitz portfolio optimization (6)



- **Overall improvement of efficient frontier:** 49.51%
- **Improvement of maximum Sharpe ratio:** 58.69%

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Effect of addition of individual futures

	Multi-Strategy	Managed-Futures	Long-Short	Fund-Of-Funds	Emerging-Markets	Short-Bias	Median
FDAX	0.66%	0.63%	-	0.75%	0.62%	29.77%	0.66%
FVS	3.54%	7.37%	-	3.42%	6.99%	34.84%	6.99%
FESB	1.98%	9.93%	-	2.23%	6.94%	40.52%	6.94%
FESX	0.69%	3.88%	-	0.96%	3.63%	35.40%	3.63%
FGBL	3.32%	1.58%	-	3.41%	8.34%	4.20%	3.41%
ALL	8.96%	16.51%	-	9.14%	19.47%	49.51%	16.51%

improvement of efficient frontier statistics

	Multi-Strategy	Managed-Futures	Long-Short	Fund-Of-Funds	Emerging-Markets	Short-Bias	Median
FDAX	0.02%	0.00%	81.14%	0.01%	0.40%	14.54%	0.21%
FVS	4.18%	4.53%	771.57%	4.93%	7.11%	25.54%	6.02%
FESB	2.32%	2.38%	491.79%	2.72%	6.85%	28.46%	4.78%
FESX	0.29%	0.51%	194.69%	0.91%	3.22%	21.29%	2.07%
FGBL	4.56%	4.97%	1769.33%	5.18%	23.78%	37.71%	14.48%
ALL	9.82%	10.35%	1982.84%	10.98%	29.73%	58.71%	20.35%

Improvement of maximum Sharpe ratio

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Conclusions

- We performed an investigation that aimed to check whether there exist diversification benefits coming from adding futures contracts traded on Eurex Exchange to the hedge fund-like mutual funds' investment spectrum
- The differences were quantified with the utilization of two statistics:overall improvement of efficient frontier and improvement of maximum Sharpe ratio
- Incorporation of analyzed futures traded on Eurex Exchange – FDAX, FVS, FESB, FESX, and FGBL – into the portfolios of hedge fund-like mutual funds may provide substantial diversification benefits
- Median decrease in volatility of efficient portfolios was equal to 16.51%
- Sharpe ratio of the optimal portfolio increased by the median value of 20.35%

Conclusions

- Funds belonging to groups *Multi-Strategy* and *Fund of Funds* are characterized by the highest level of diversification – in these cases improvements were lowest.
- Among analyzed futures FVS and FGBL turned out to provide highest diversification benefits

Thank you for your attention!