**RUTGERS**

Financial Modeling: Portfolio Management Project

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Portfolio Policy

Scope of investment :

30 large stocks listed in the course's syllabus

Investment Objectives:

- (1) Achieve long term returns that exceed DJIA /SP500 by 1% per year.
- (2) The volatility of return is less than DJIA/SP500, equally to market beta (one variable linear regression) less than 1.

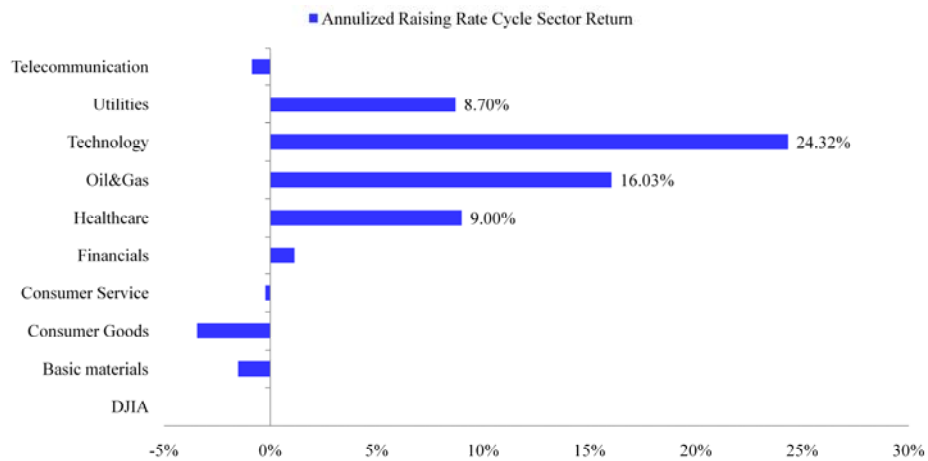
Roles and Responsibility:

The investment managers will implement professional financial knowledge to purchase, sell, or hold the specific securities that will be used to meet the long term portfolio's investment objectives

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portfolio return = $\alpha + \beta \times \text{market return}$

Sector allocation (Monetary Policy)



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Last three FED Raising Rate Cycles:

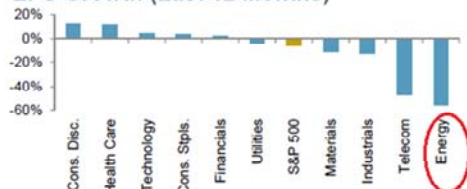
(1) 2004/6/29-2006/6/30 (2 years)

(2) 1999/6/29-2000/5/17 (0.89 year)

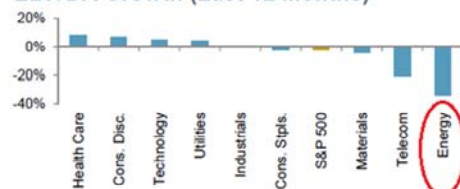
(3) 1994/2/3-1995/2/2 (1 year)

Sector Fundamentals (as of 12/31/2015)

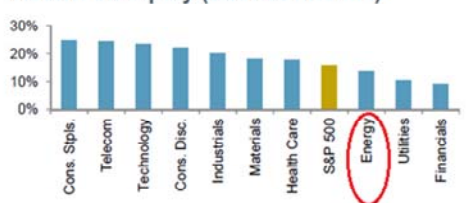
EPS Growth (Last 12 Months)



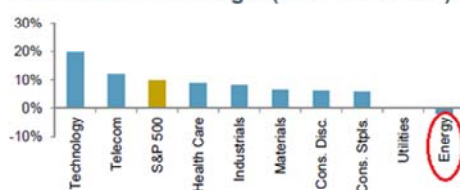
EBITDA Growth (Last 12 Months)



Return on Equity (Last 12 Months)



Free-Cash-Flow Margin (Last 12 Months)



Source: FactSet, Fidelity

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Short Energy Sector

Individual Stock Selection

Variance - Covariance Matrix

	Pfizer	Exxon Mobil	3M	Intel	Verizon	Procter and Gamble
Pfizer	4.13339E-05	-2.34752E-05	-6.8987E-06	1.58551E-05	-8.87702E-06	-6.67545E-06
Exxon Mobil	-2.34752E-05	5.63382E-05	3.51308E-05	2.38459E-05	1.80262E-05	2.60032E-05
3M	-6.8987E-06	3.51308E-05	3.22121E-05	2.33348E-05	1.30361E-05	1.77752E-05
Intel	1.58551E-05	2.38459E-05	2.33348E-05	5.59055E-05	-2.30073E-06	1.29823E-05
Verizon	-8.87702E-06	1.80262E-05	1.30361E-05	-2.30073E-06	2.48309E-05	1.43321E-05
Procter and Gamble	-6.67545E-06	2.60032E-05	1.77752E-05	1.29823E-05	1.43321E-05	2.44714E-05
	Pfizer	Exxon Mobil	3M	Intel	Verizon	Procter and Gamble
Weights	0.17354917	0	0.544546897	0.003744954	0.240888854	0.037270126
Pfizer	0.17354917	1.24495E-06	0	-6.51966E-07	1.03048E-08	-3.71113E-07
Exxon Mobil	0	0	0	0	0	0
3M	0.544546897	-6.51966E-07	0	9.55189E-06	4.75868E-08	1.71002E-06
Intel	0.003744954	1.03048E-08	0	4.75868E-08	7.84057E-10	-2.07553E-09
Verizon	0.240888854	-3.71113E-07	0	1.71002E-06	-2.07553E-09	1.44087E-06
Procter and Gamble	0.037270126	-4.31781E-08	0	3.60753E-07	1.812E-09	1.28673E-07
Total	1	1.88997E-07	0	1.10183E-05	5.84121E-08	2.90637E-06

Portfolio Optimization 130/30 Strategy



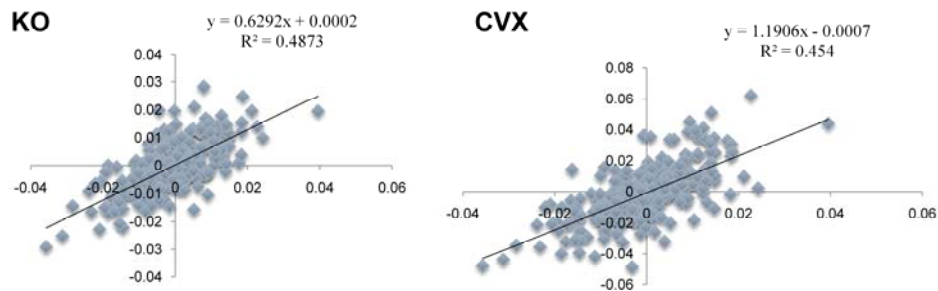
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CFA recommend 130/30 strategy to increase the portfolio's information ratio (0.541).
information ratio=(portfolio return-bench index return)/standard deviation of excess return

Gordon B. Fowler, Jr. Understanding 130/30 Equity Strategies, 2007

<http://www.cfapubs.org/doi/pdf/10.2469/cp.v24.n3.4848>

Portfolio Optimization Min Beta Max Alpha



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Portfolio Beta 2016/01/29: Long position 0.855, Long/Short 0.614

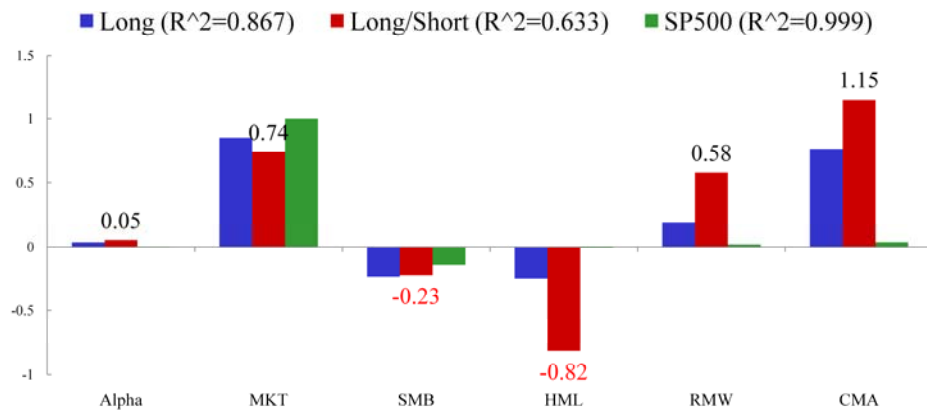
Portfolio Beta 2016/02/12: Long position 0.818, Long/Short 0.532

Long lower beta stock with positive alpha, short higher beta stock with negative alpha

For example: long KO, beta is 0.6292, alpha is 0.0002, short CVX, beta is 1.1906, alpha is -0.0007.

But adjusted R square is lower, covering less than half of return.

Performance Analysis: Fama 5 factors



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From 2015/1/1-2016/1/29

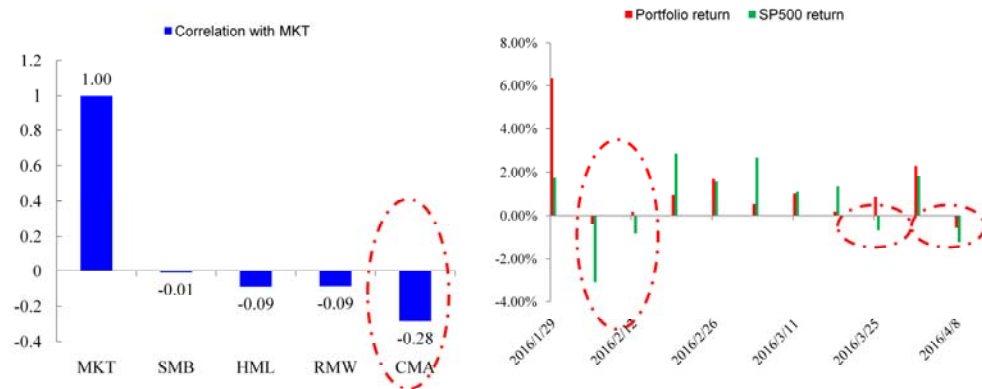
SMB: small minus big

HML: high value minus low value

RMW: high operating profit minus low operating profit

CMA: Conservative minus Aggressive

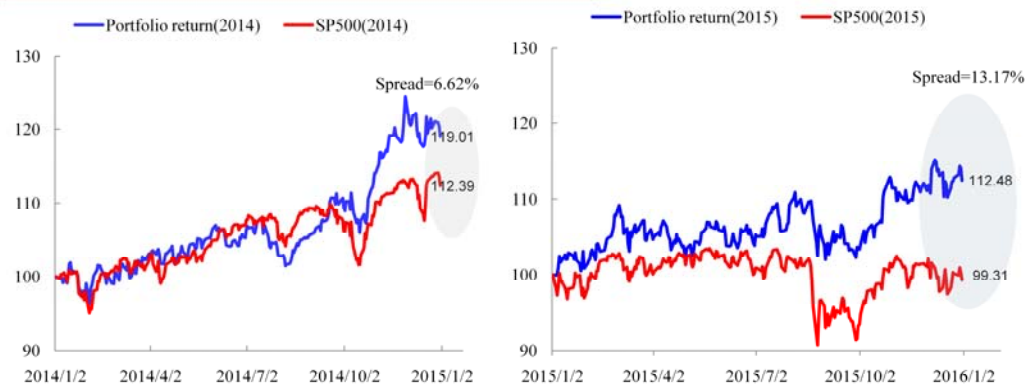
Performance Analysis: Fama 5 factors



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Correlation from 2015/1/1-2016/1/29, 270 observations

Portfolio Further Optimization (Back test): Trade off between MKT and CMA



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2006/1/1-2016/3/15: SP500, 98.16, Portfolio, 107.05, spread, 8.89%

Weekly Portfolio Management Conclusion

Statistics Before cost		value	t-ratio	result
	Portfolio return	1.1936%	1.98019494	do not reject
	Excess return over T-bill	1.1332%	1.87846055	do not reject
	Excess return over DJIA	0.3764%	0.67180805	do not reject
	Market alpha	0.006855418	1.18689327	do not reject
	Market beta	0.591528843	1.7901596	do not reject
Statistics After cost				
	Portfolio return	1.1854%	1.97511265	do not reject
	Excess return over T-bill	1.1250%	1.87295456	do not reject
	Excess return over DJIA	0.3682%	0.66048017	do not reject
	Market alpha	0.006773861	1.17963485	do not reject
	Market beta	0.591494326	1.80052848	do not reject

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Weekly Portfolio Management Conclusion

	Before Cost	After cost
Portfolio mean return	1.1936%	1.1854%
Standard deviation	0.019061335	0.018979387
Best weekly return	6.3493%	6.3193%
Worst weekly return	-0.5538%	-0.5538%
Number of winning week	9	9
Number of losing week	2	2
Maximum consecutive losing week	1	1
Market alpha	0.006855418	0.006773861
Market beta	0.591528843	0.591494326
Sharpe Ratio	0.594505845	0.592761867
Treynor measure	0.019157265	0.019020058
M-square	0.01810	0.01802
Appraisal ratio	0.396999181	0.394571341

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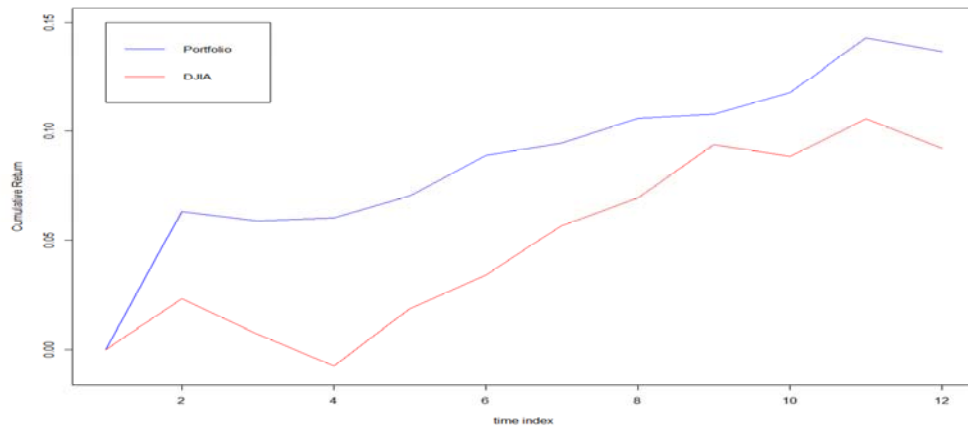
Sharpe ratio measures returns earned in excess of the [risk-free rate](#) per unit total risk.

Treynor ratio measures returns earned in excess of the risk-free rate per unit of [market risk](#).

M-square return we would get if the portfolio had the same total risk at the market portfolio.

Appraisal ratio measure the quality of a fund's investment picking ability, It compares the fund's [alpha](#) to the portfolio's [unsystematic risk](#).

Conclusion



Conclusion

- (1) From last 11 weeks our portfolio performs much better than risk free asset and DJIA
- (2) But it can't be proved, since the statistic results are insignificant
- (3) In the future work, we still need to find a better risk measurement



Thank you!