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RESEARCH INVESTMENT SUITE

Efficient Frontier Analysis

WRDS Research Analytics

Analytic Summary	Solution
INPUT PARAMETERS	
Analysis Start Date	2010/01
Analysis End Date	2015/12
Months Used	71
Annual Risk Free Rate	0.50%
Number of Stocks Used	9
Lowest Position of a Constituent	0.00%
Highest Position of a Constituent	50.00%
Degree of Risk Aversion	30.00
UNCONSTRAINED OPTIMIZATION RESULTS	
Global Minimium Variance Portfolio Return (Annualized)	11.60%
Global Minimium Variance Portfolio Sigma (Annualized)	8.66%
Tangency Portfolio Return (Annualized)	18.54%
Tangency Portfolio Sigma (Annualized)	11.04%
Unconstraint Sharpe Ratio	1.63
CONSTRAINED OPTIMIZATION RESULTS	
Constrained Minimium Variance Portfolio Return (Annualized)	13.12%
Constrained Minimium Variance Portfolio Sigma (Annualized)	9.30%
Constrained Tangency Portfolio Return (Annualized)	16.34%
Constrained Tangency Portfolio Sigma (Annualized)	10.21%
Constrained Sharpe Ratio	1.55
INDIFFERENCE CURVE ANALYSIS	
Risk Averse Optimal Weight - Risky Asset (Unconstrained)	49.31%
Optimized Utility Value (Unconstrained)	0.00412
Risk Averse Optimal Weight - Risky Asset (Constrained)	50.66%
Optimized Utility Value (Constrained)	0.00376

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Figure I: Mean-Variance Efficient Frontier

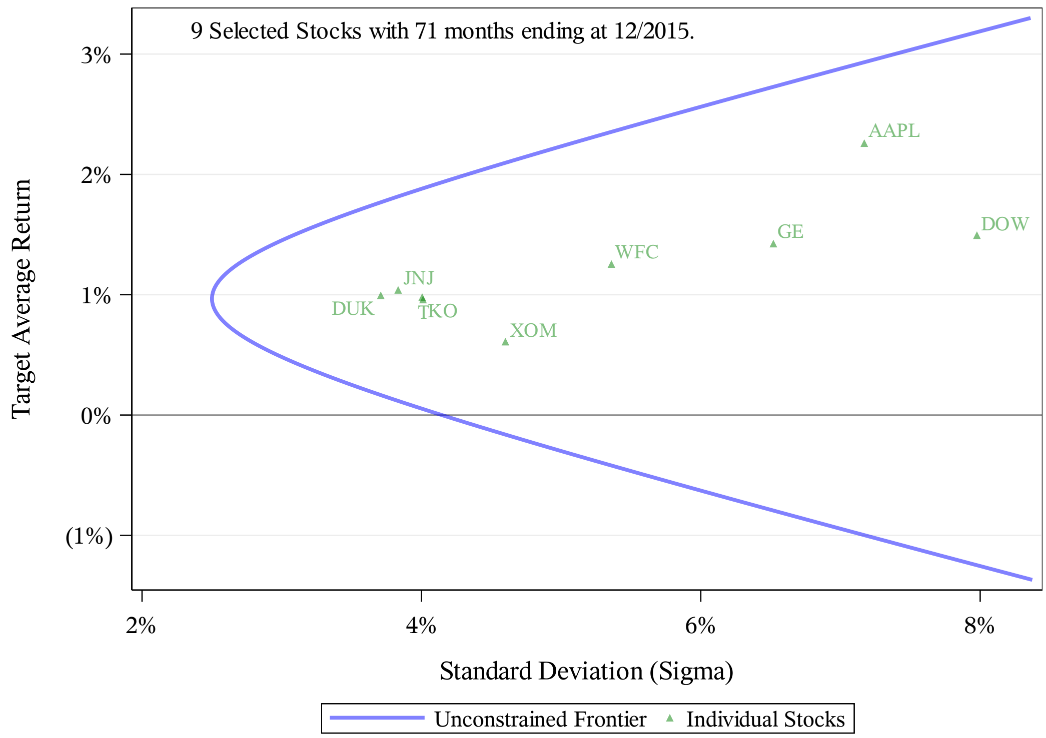


Figure II: Capital Market Line (Unconstrained)

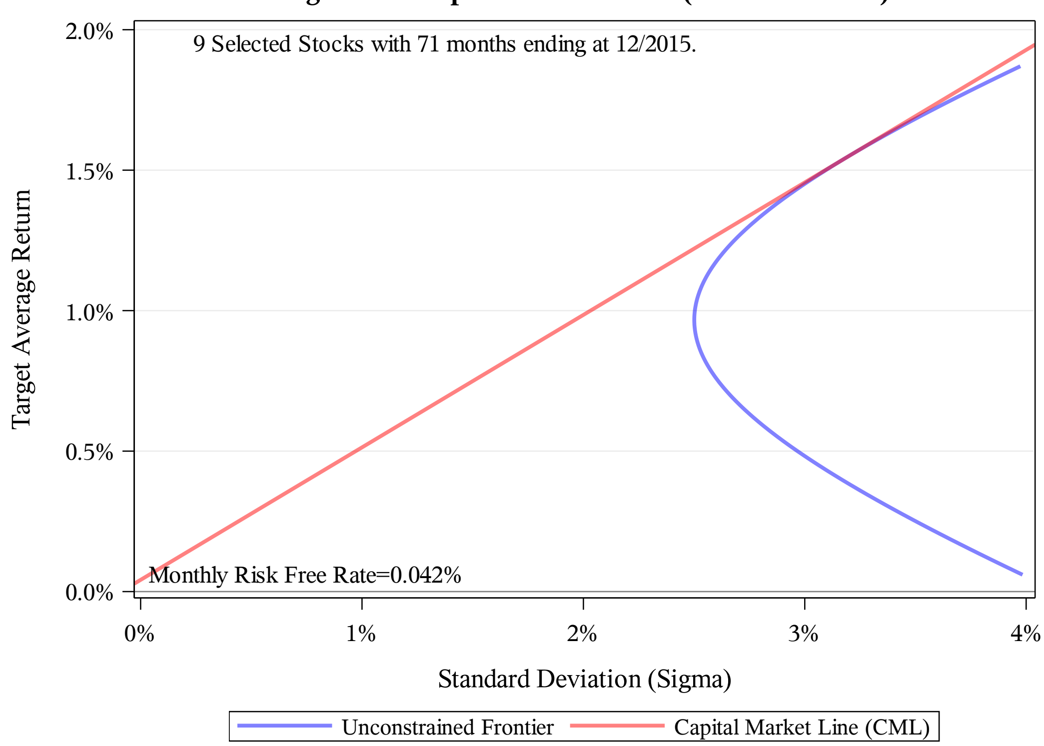


Figure III: Capital Market Line (Unconstrained vs Constrained)

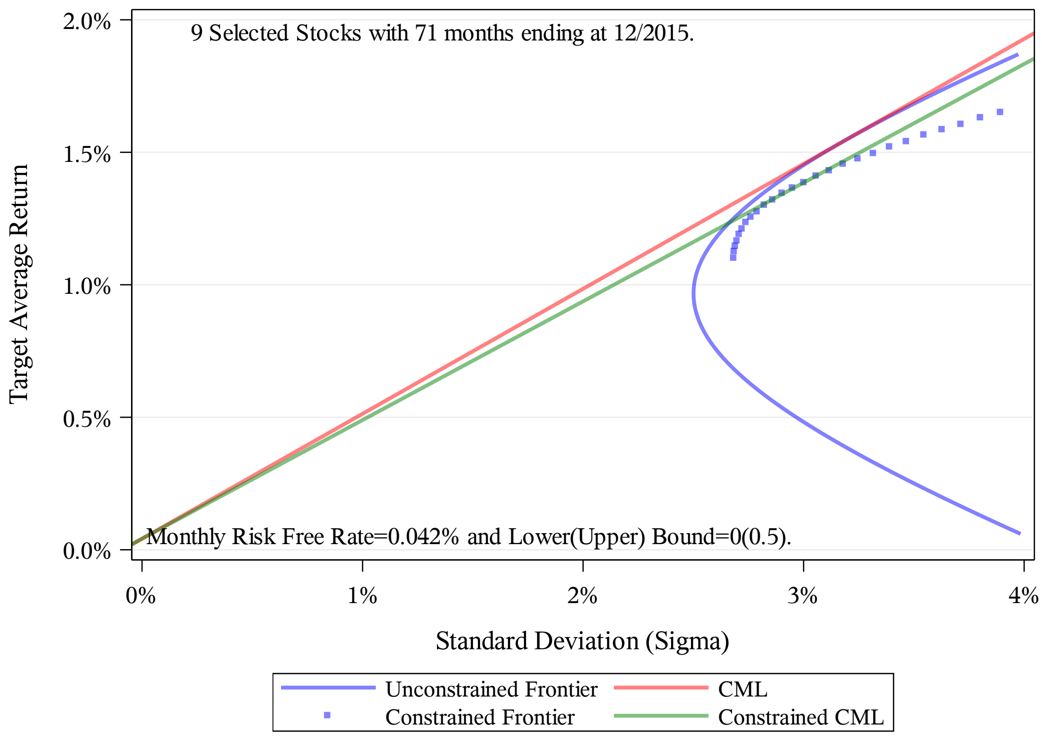
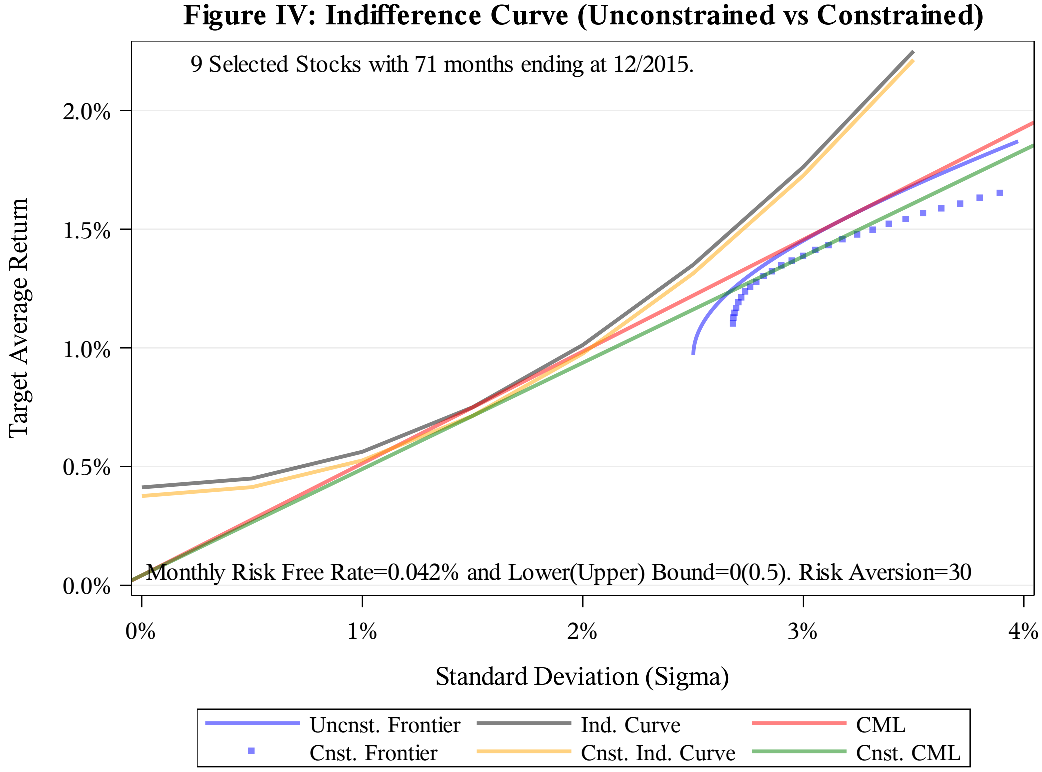


Figure IV: Indifference Curve (Unconstrained vs Constrained)



Risky Portfolio Allocation:

Ticker	Global Minimium Variance Portfolio	Uncontrainted Tangency Portfolio	Contrainted Minimium Variance Portfolio	Contrainted Tangency Portfolio
AAPL	8.70%	29.70%	9.28%	27.01%
XOM	19.90%	(28.00%)	8.35%	0.00%
GE	(27.90%)	(3.30%)	0.00%	0.00%
JNJ	13.40%	21.60%	14.37%	12.46%
WFC	19.00%	10.20%	6.43%	3.19%
T	23.50%	13.50%	16.31%	9.20%
KO	6.60%	(4.40%)	5.29%	0.00%
DOW	3.10%	10.10%	0.00%	3.34%
DUK	33.70%	50.50%	39.97%	44.81%