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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	4
Lowest Position of a Constituent	0.00%
Highest Position of a Constituent	60.00%
Degree of Risk Aversion	30.00
UNCONSTRAINED OPTIMIZATION RESULTS	
Global Minimum Variance Portfolio Return (Annualized)	10.19%
Global Minimum Variance Portfolio Sigma (Annualized)	13.79%
Tangency Portfolio Return (Annualized)	26.22%
Tangency Portfolio Sigma (Annualized)	22.47%
Unconstraint Sharpe Ratio	1.14
CONSTRAINED OPTIMIZATION RESULTS	
Constrained Minimum Variance Portfolio Return (Annualized)	11.22%
Constrained Minimum Variance Portfolio Sigma (Annualized)	13.85%
Constrained Tangency Portfolio Return (Annualized)	22.93%
Constrained Tangency Portfolio Sigma (Annualized)	19.74%
Constrained Sharpe Ratio	1.14
INDIFFERENCE CURVE ANALYSIS	
Risk Averse Optimal Weight - Risky Asset (Unconstrained)	16.98%
Optimized Utility Value (Unconstrained)	0.00224
Risk Averse Optimal Weight - Risky Asset (Constrained)	19.19%
Optimized Utility Value (Constrained)	0.00221

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Figure I: Mean-Variance Efficient Frontier

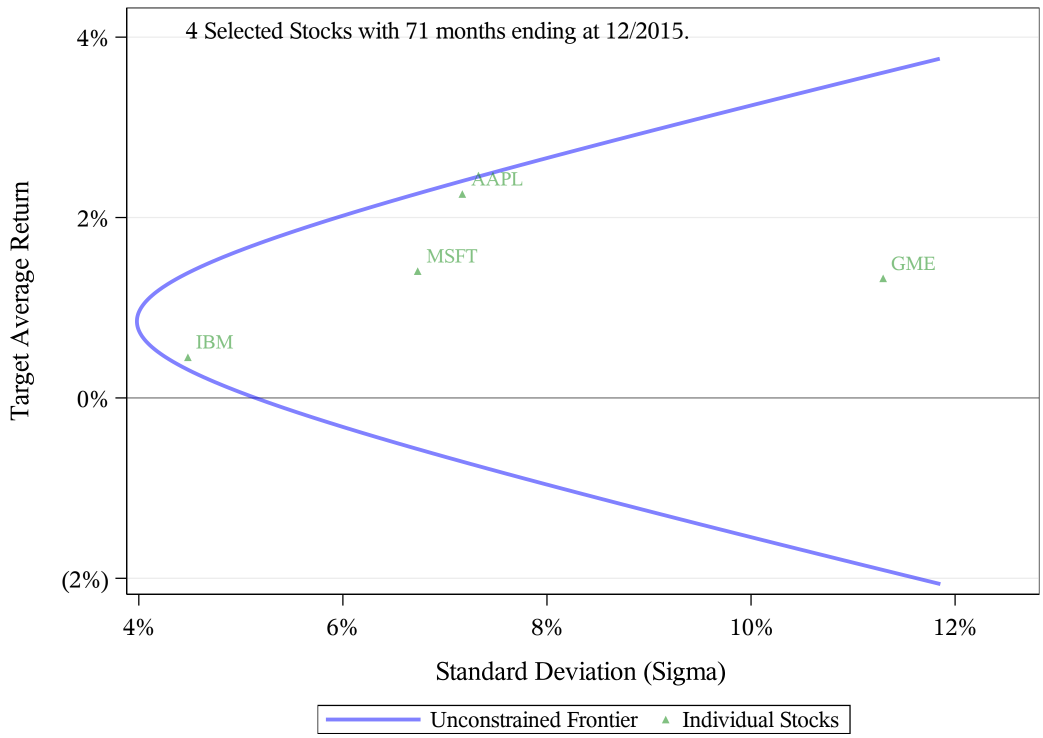


Figure II: Capital Market Line (Unconstrained)

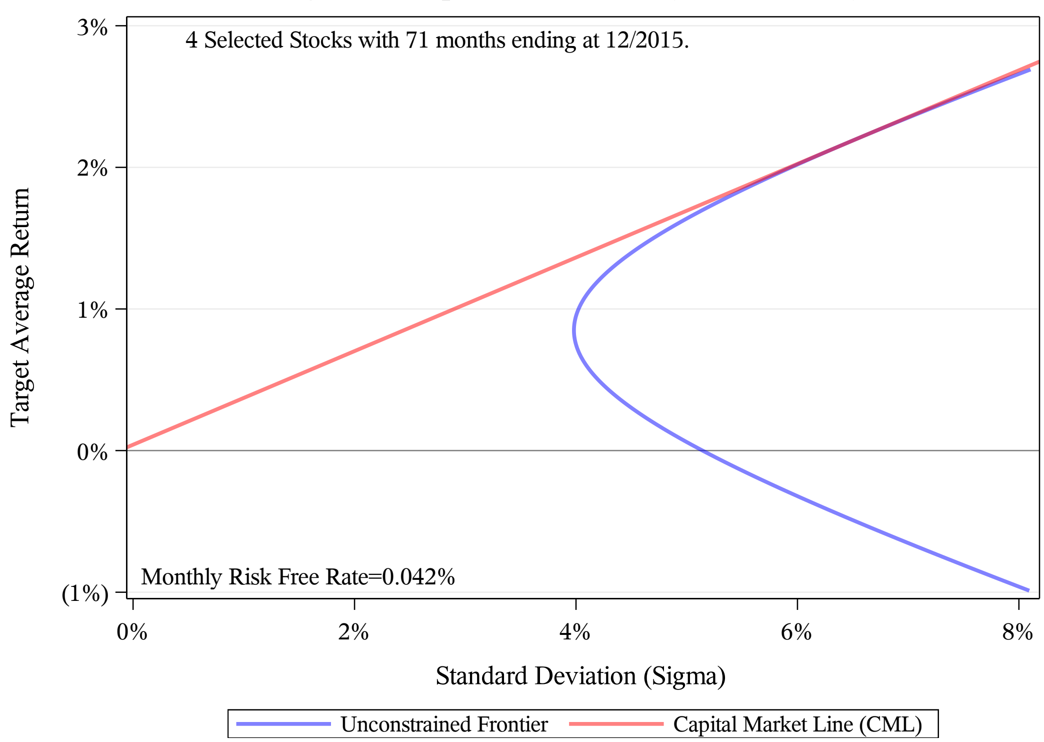


Figure III: Capital Market Line (Unconstrained vs Constrained)

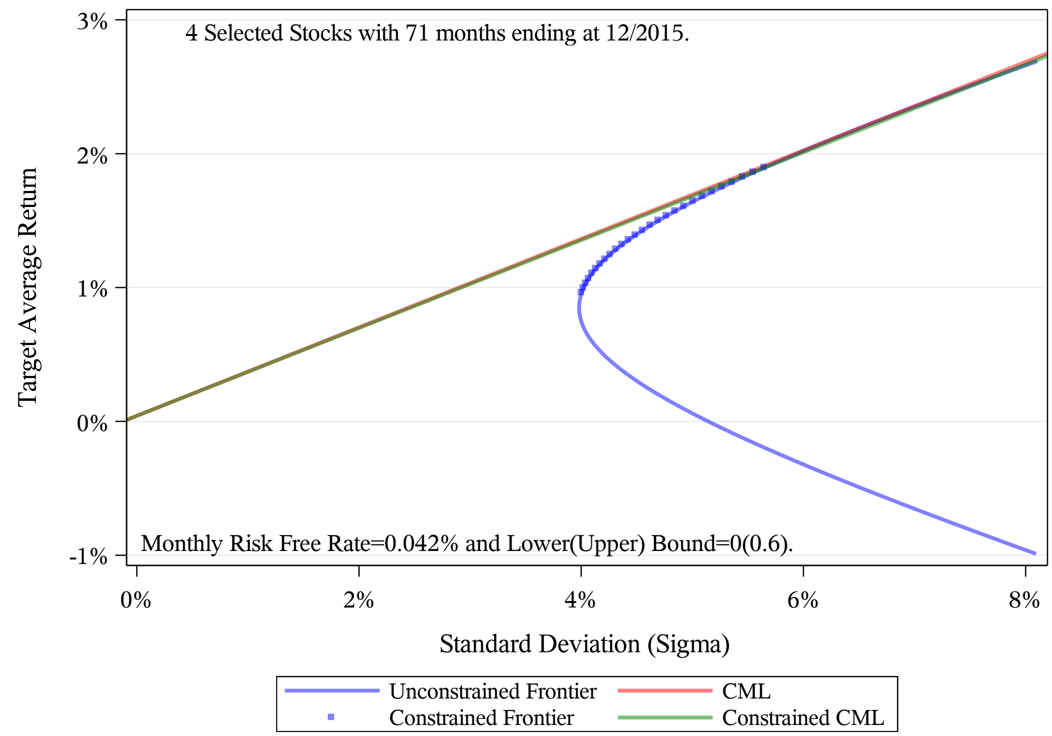
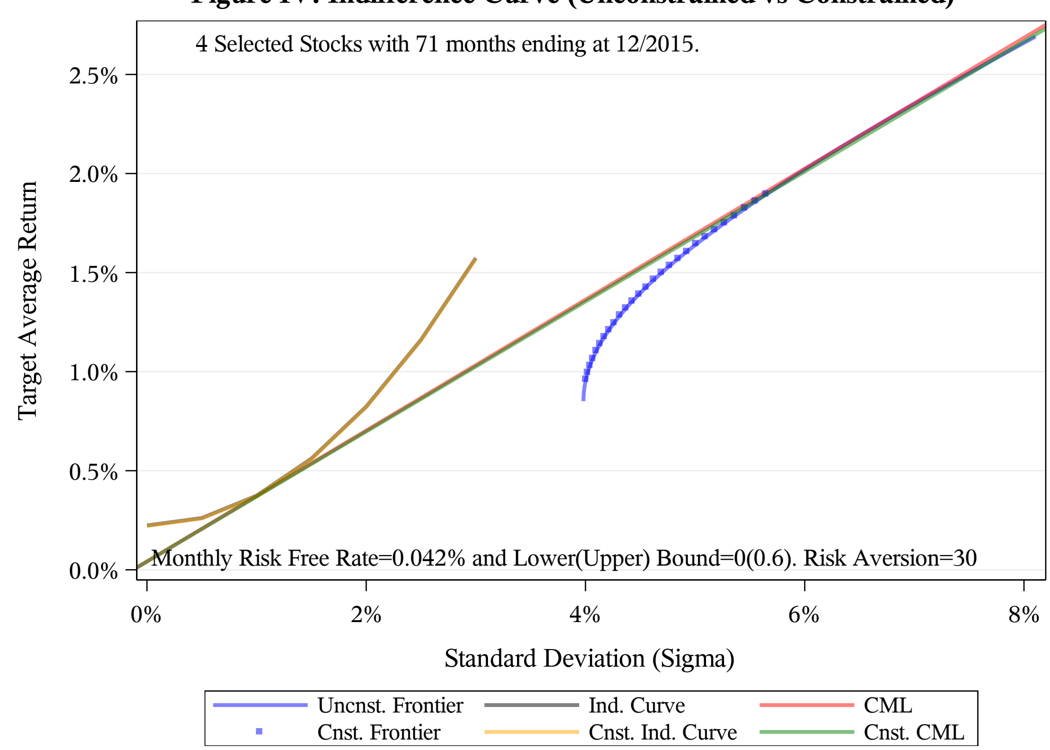


Figure IV: Indifference Curve (Unconstrained vs Constrained)



Risky Portfolio Allocation:

Ticker	Global Minimium Variance Portfolio	Uncontrainted Tangency Portfolio	Contrainted Minimium Variance Portfolio	Contrainted Tangency Portfolio
AAPL	10.40%	75.30%	13.22%	59.99%
MSFT	14.40%	34.40%	17.72%	33.51%
IBM	66.50%	(14.70%)	60.00%	0.11%
GME	8.70%	5.00%	9.06%	6.39%