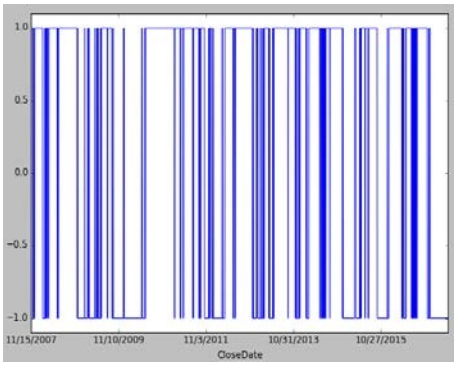
Example of Penalized Regression Approach in a Multi Asset Trend Following Strategy

We illustrate an application of Lasso by estimating the 1-day returns of assets in a cross-asset momentum model. For more background on trend following strategies see our CTA primer. We attempt to predict the returns of 4 assets: S&P 500, 7-10Y Treasury Bond Index, US dollar (DXY) and Gold. For predictor variables, we choose lagged 1M, 3M, 6M and 12M returns of these same 4 assets, yielding a total of 16 variables. To calibrate the model, we used a rolling window of 500 trading days (~2y); re-calibration was performed once every 3 months. The model was used to predict the next day's return. If the next day predicted return was positive, we went long the asset, otherwise we shorted it. Prior to regression, all inputs were standardized to avoid the problem of input features being of different scales. Performance of this momentum strategy is shown in tables below for each of the assets. Note that each of the momentum strategies outperformed a long only position in their respective asset.

S&P 500 (Lasso $\alpha = 0.001$) IR = 0.43

PnL vs Always-Long

Buy/Sell Indicator



Performance Analytics

	Annualized Return (%)	Sharpe Ratio
S&P 500	7.52	0.36
S&P 500- Lasso	8.92	0.42
Correlation	41.3%	

Sample Signals Chosen (14 to 16 factors chosen)

	1M	3M	6M	12M
Bond	✓	✓	✓	✓
Gold	✓	×	✓	✓
Dollar	×	✓	✓	✓
Equity	✓	✓	✓	✓

Result for IEF - Lasso ($\alpha = 0.001$) yields IR = 0.67

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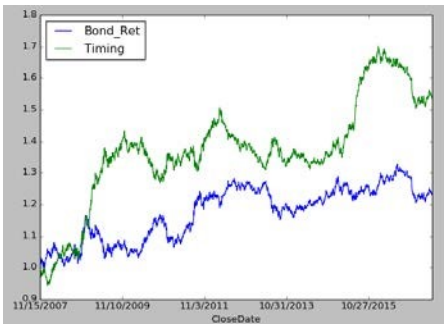
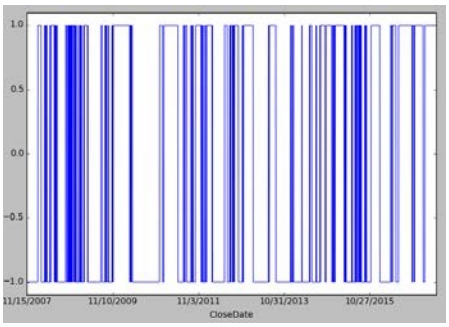
PnL vs Always-Long



Buy/Sell Indicator



Performance Analytics

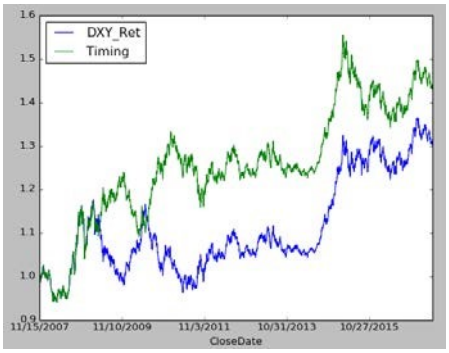
	Annualized Return (%)	Sharpe Ratio
IEF	2.30	0.32
IEF- Lasso	4.86	0.67
Correlation	-19.4%	

Sample Signals Chosen(12 to 16 factors chosen)

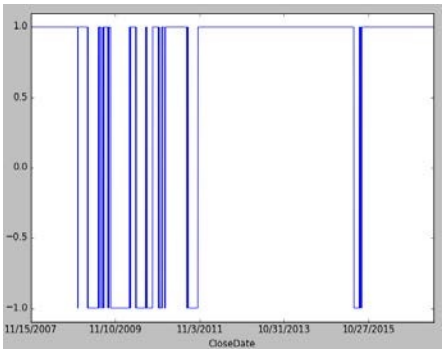
	1M	3M	6M	12M
Bond	✓	✓	✓	✓
Gold	✓	✓	✓	✓
Dollar	✓	✓	✓	✓
Equity	✓	×	✓	×

Result for DXY - Lasso (α = 0.05) yields IR = 0.50

PnL vs Always-Long



Buy/Sell Indicator



Performance Analytics

	Annualized Return (%)	Sharpe Ratio
DXY	3.22	0.38
DXY- Lasso	4.20	0.49
Correlation	58.9%	

Sample Signals Chosen(0 to 3 factors chosen)

	1M	3M	6M	12M
Bond	×	×	×	×
Gold	×	×	✓	×
Dollar	×	×	×	×
Equity	✓	×	×	✓

Result for GLD - Lasso (α = 0.05) yields IR = 0.50

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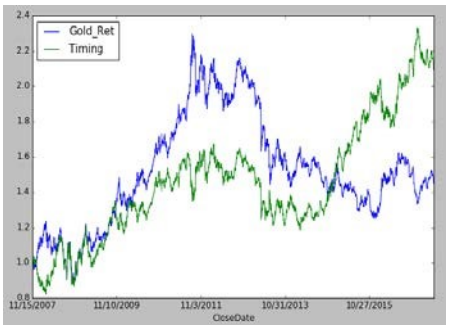
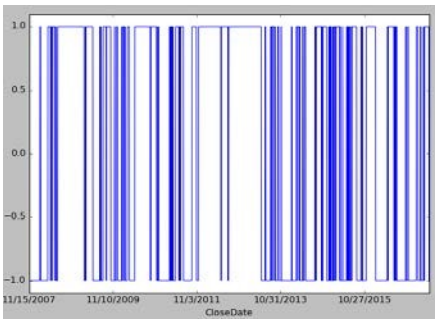
PnL vs Always-Long



Buy/Sell Indicator



Performance Analytics

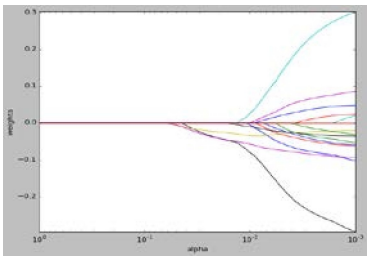
	Annualized Return (%)	Sharpe Ratio
Gold	6.12	0.31
GLD- Lasso	9.49	0.48
Correlation	20.3%	

Sample Signals Chosen(1 to 7 factors chosen)

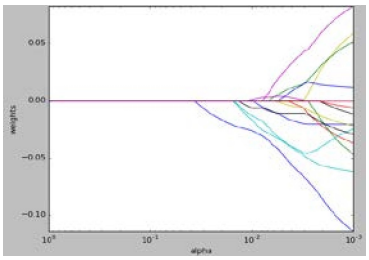
	1M	3M	6M	12M
Bond	×	✓	×	×
Gold	✓	×	×	✓
Dollar	✓	×	×	×
Equity	×	×	×	×

Evolution of betas as function of alpha in Lasso regression for 4 assets

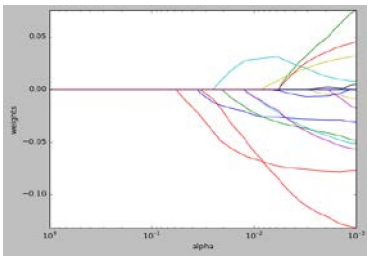
SPX



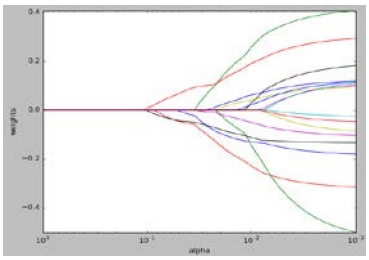
IEF



DXY



GLD



Combined Performance

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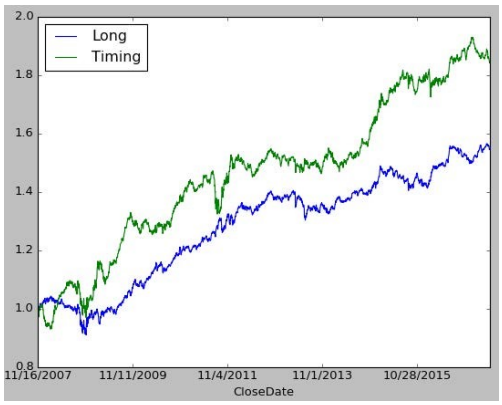
Marko Kolanovic, PhD
(1-212) 272-1438
marko.kolanovic@jpmorgan.com

PnL vs Long : Cross-Asset



Performance Analytics

	Annualized Return (%)	Sharpe Ratio
X-A Long	4.80	0.75
X-A Lasso	6.80	0.85

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