## Empirical Asset Pricing for Tactical Asset Allocation

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Background	In	troduction	Model	Conclusion
	E	Background		

#### Portfolio Managers

- Want to justify fees with some active management
- Low frequency: rebalance portfolio monthly
- Fundamental data does not change on a monthly basis

Introduction	Process	Conclusion
Background		

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  - Joint distributions change over time (time varying covariance)
  - Innovations occur at different lags for each asset class pair

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#### Restrictions

- Simple to understand and implement
- No expensive data sources
- US Equity, International Equity, Bonds, REITs, & Alternatives

Mod

# Rolling 12 month Correlations



#### Empirical Asset Pricing for Tactical Asset Allocation

	Process	Conclusion
Process		

#### **Risk Factors**

- Trailing joint distribution characteristics
- Factor = high-low return over risk factor measurement period

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Introduction Proces	Model	Conclusion
Process		

#### **Risk Factors**

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Process

- Calculate each unique spread (20 spreads from 5 asset classes)
- Calculate spread statistics on trailing 24 month windows
- Calculate spread differential between high/low statistic
- Regress spreads on risk factors

	Model	Conclusion
Model		

For each risk factor i and asset classes a, b, c, d, e

$$rf_{i,t} = \Sigma Ret\{rf_{max\{|a|:|e|\},t:t-12}\} - \Sigma Ret\{rf_{min\{|a|:|e|\},t:t-12}\}$$
(1)  
For asset classes a and b

$$Ret_{a-b} = X'\beta \tag{2}$$

where X is the trailing sum of the return spread associated with the return, standard deviation, skewness, kurtosis, hedge ratio deviation, and interaction terms

Introduction	Process	Model	Conclusion
Variables			

## Dependent Variable

• Spread on each asset class pair

## Independent Variables

- Distribution risk factors (return, standard deviation, skewness, kurtosis, & interactions)
- CBOE Volatility Index (VIX)
- US treasury 1 year constant maturity rate
- Term spread (10 year treasury 2 year treasury)
- Hedge Deviation (absolute deviation from a hedge ratio of 1)
- Cointegration (Augmented Dickey-Fuller test with nonstationary null)

## Full GLS Model Results

	Estimate	Std. Error	t value	$\Pr(> t )$
(Intercept)	0.00000	0.003369	0.000000	1.0000
VIX	0.00092	0.000550	1.670240	0.0950
1yr Treasury	21.64806	5.129599	4.220225	0.0000
10yr - 2yr	40.71688	9.390477	4.335976	0.0000
Return	-0.04989	0.020827	-2.395686	0.0167
Std Dev	-0.01131	0.023206	-0.487437	0.6260
Return & Std Dev	-0.03620	0.025436	-1.423198	0.1548
Skewness	0.02894	0.024912	1.161726	0.2455
Kurtosis	0.02122	0.021571	0.983561	0.3254
Correlation	0.01556	0.028694	0.542404	0.5876
Correlation & Return	-0.03933	0.021340	-1.843081	0.0654
Correlation & Std Dev	-0.00162	0.030030	-0.054110	0.9569
Correlation & Skewness	0.00673	0.024916	0.270063	0.7871
Correlation & Kurtosis	-0.01815	0.022812	-0.795564	0.4264
Skewness & Kurtosis	-0.00668	0.022161	-0.301550	0.7630
Std Dev & Kurtosis	-0.04997	0.020984	-2.381084	0.0173
Return & Skewness	-0.02241	0.020205	-1.109172	0.2675
Return & Kurtosis	0.02203	0.018866	1.167590	0.2431
Std Dev & Skewness	-0.00336	0.025806	-0.130373	0.8963
Hedge Deviation	-0.00266	0.018955	-0.140479	0.8883
Cointegration	-0.01008	0.017530	-0.574736	0.5655
Return & Std Dev Skewness Kurtosis Correlation & Return Correlation & Std Dev Correlation & Skewness Correlation & Kurtosis Skewness & Kurtosis Std Dev & Kurtosis Return & Skewness Return & Kurtosis Std Dev & Kurtosis Std Dev & Skewness Hedge Deviation	-0.03620 0.02894 0.02122 0.01556 -0.03933 -0.00162 0.00673 -0.01815 -0.00668 -0.04997 -0.02241 0.02203 -0.00266	0.025436 0.024912 0.021571 0.028694 0.021340 0.020300 0.024916 0.022812 0.022161 0.020984 0.020205 0.018866 0.025806 0.018555	-1.423198 1.161726 0.983561 0.542404 -1.843081 -0.054110 0.270063 -0.795564 -0.301550 -2.381084 -1.109172 1.167590 -0.130373 -0.140479	0.1548 0.2455 0.3254 0.5876 0.0654 0.9569 0.7871 0.4264 0.7630 0.0173 0.2675 0.2431 0.8963 0.8883

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	Model	Conclusion

# Restricted GLS Model Results

Drop variables based on:

- Changes to log likelihood
- Impact on and correlation with other variables

-	Estimate	Std. Error	t value	$\Pr(> t )$
(Intercept)	0.00000	0.003364	0.000000	1.0000
VIX	0.00111	0.000504	2.201104	0.0278
1yr Treasury	22.36054	4.407615	5.073160	0.0000
10yr - 2yr	42.43004	8.258652	5.137647	0.0000
Return	-0.03798	0.017457	-2.175522	0.0297
Return & Std Dev	-0.04376	0.019151	-2.285088	0.0224
Correlation & Return	-0.04572	0.019484	-2.346605	0.0190
Std Dev & Kurtosis	-0.03655	0.012719	-2.874040	0.0041

Conclusion	Model		Flocess	roduction
			lel Comparison	Mode
				_
	Restricted Model	Full Model		_
	917.5741	881.9172	Log Likelihood	
	0.160958	0.161205	Residual Standard Error	
				_

Conclusion

			Model	Conclusion
N.A				
IVIOC	lel Comparison			
-		Full Model	Restricted Model	
	Log Likelihood	881.9172	917.5741	
	Residual Standard Error	0.161205	0.160958	
Perf	ormance Probability Monthly F	Return > Nei	utral 99.85%	
	Probability of Positiv			
	Probability of Positiv	ve 2 Year Re	turn 90.00%	
	Expected	Monthly Re	turn 0.97%	
	Expecte	d Annual Re	turn 11.63%	
	Media	n Annual Re	turn 10.02%	
	TAA Band Size	at 1% Thres	hold 8.60	

Monthly Information Ratio .2142

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# Questions?

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500