MFE402 Financial Accounting
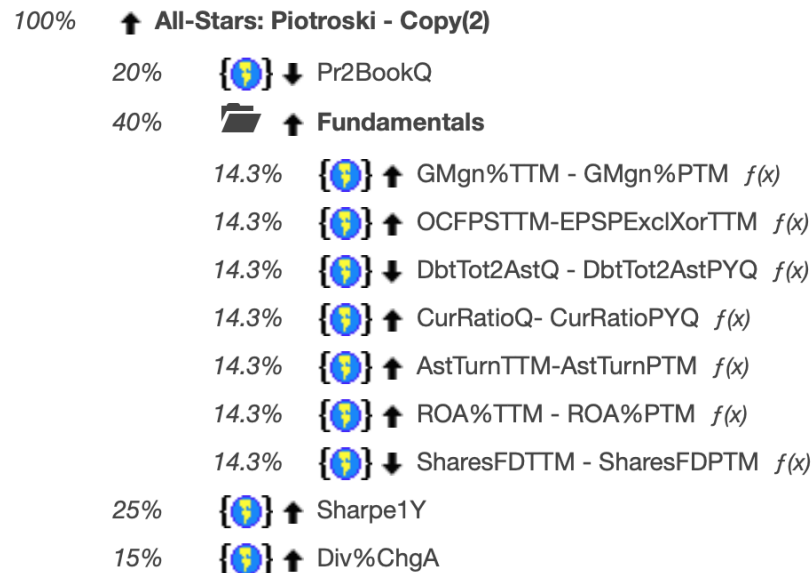# Case 8

Huanyu Liu, Hyeuk Jung, Jiaqi Li, Xichen Luo

1. Improved Piotroski Model
1) Updated factors

[Plot 1. Portfolio Ranking Systems]

We improved our model by adding two more factors on the original Piotroski model:
- One Year Sharpe Ratio (Sharpe1Y)
- Annual dividend percentage change (Div%ChgA)

We also re-assigned weights to the model factors:
- 60% on the original model factors (20% on Pr2BookQ and 40% on Fundamentals)
- 40% on the added 2 factors (15% on Div%ChgA and 25% on Sharpe)

2) 20% Price-to-Book ratio (Pr2BookQ) and 40% fundamentals
At first we tried 30% and 30%, the active return increased by around 2000%. Then we tried to adjust the weight by 10%, so we have tried 20% and 40%, 40% and 20%, 10% and 50%, 50% and 10%. As a result, 20% Pr2BookQ and 40% Fundamentals will generate the highest active return. We optimised our portfolio by changing the weights.

3) Sharpe ratio and dividend percent change (YoY, %)
To improve the original model, we focused more on the return of our portfolio by adding the sharpe ratio factor in our model so that we can maximize our return per unit risk. At the same time, we want to

choose firms which have better performance so our portfolio will be more stable. Thus, we include the factor of the "annual growth of percentage change of dividend" in our model.

2. Simulation
1) Simulation settings
In the simulation, we followed the default settings except the below five.

Commission	$10 flat fee
Rebalancing period	quarterly (every 13 weeks)
Simulation period	Max (20 years, 1999/01/02 ~ 2018/12/03)
Universe	All fundamentals in USA
Ranking methods	Percentile NAs neutral

[Graph 1. Investment Settings]

General

Name	Simulation(2)
Visibility	Private
Category	Unclassified
Starting Capital	$100,000.00
Benchmark	S&P 500 (SPY)
Commission	10.0 Flat Fee ($)
Slippage	Variable
Transaction Type	Long
Use Margin	No
Management Fee	0.0%
Price for Transactions	Next Open
Transaction Save	Yes

Rebalance

Sizing Method	% Portfolio Weight
Ideal Size of a New Position	5%
Ideal Number of Positions	20
Rebalance Frequency	Every 13 Weeks
Allow Immediate Buyback	No
Buy Constraint	30% +/-

Universe & Ranking

Universe	All Fundamentals - USA
Ranking System	All-Stars: Piotroski
Ranking Method	Percentile NAs Neutral
Force Weekly Ranks	Yes
Force Positions into Universe	No

## Buy Rules *(Implicit AND)*   copy to screen

Liquidity	Price > 1 & AvgVol(20) > 50000 // Skip penny/illiquid stocks

Sell Rules *(Implicit OR)*   copy to screen

Rank	Rank < 60 // Sell low-ranking stocks

Stop Loss

Strategy	None

Hedge / Market Timing DISABLED

Period & Restrictions

Period	01/02/1999 - 12/03/2018
Exposure List	None
Restrict Buy List	
Restrict Sell List	
Load Global Restrictions	Yes
Allow Mergers	No

[Plot 2. Simulation Settings for Original Piotroski Model]

General

|	
Name	Simulation(2)
Visibility	Private
Category	Unclassified
Starting Capital	$100,000.00
Benchmark	S&P 500 (SPY)
Commission	10.0 Flat Fee ($)
Slippage	Variable
Transaction Type	Long
Use Margin	No
Management Fee	0.0%
Price for Transactions	Next Open
Transaction Save	Yes

Rebalance

Sizing Method	% Portfolio Weight
Ideal Size of a New Position	5%
Ideal Number of Positions	20
Rebalance Frequency	Every 13 Weeks
Allow Immediate Buyback	No
Buy Constraint	30% +/-

Universe & Ranking

Universe	All Fundamentals - USA
Ranking System	All-Stars: Piotroski - Copy(2)
Ranking Method	Percentile NAs Neutral
Force Weekly Ranks	Yes
Force Positions into Universe	No

Buy Rules (Implicit AND)   copy to screen

Liquidity	Price > 1 & AvgVol(20) > 50000 // Skip penny/illiquid stocks

Sell Rules (Implicit OR)   copy to screen

Rank	Rank < 60 // Sell low-ranking stocks

Stop Loss

Strategy	None

Hedge / Market Timing DISABLED

Period & Restrictions

Period	01/02/1999 - 12/03/2018
Exposure List	None
Restrict Buy List	
Restrict Sell List	
Load Global Restrictions	Yes
Allow Mergers	No

[Plot 3. Simulation Settings for Improved Piotroski Model]

2) Simulation results
(1) Original Piotroski model

Piotroski_original

Summary	Re-Run	Holdings	Transactions	Trading System	Statistics	Charts

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Model — Benchmark   Basic Interactive </> embed
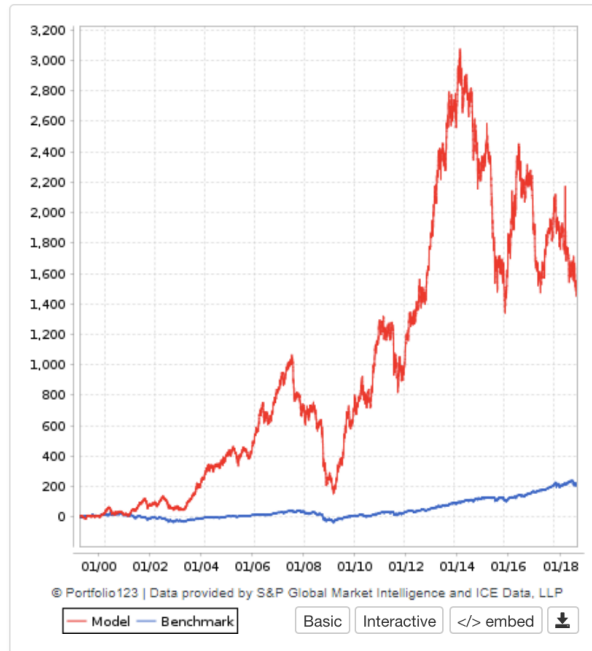
General Info

Total Market Value (inc. Cash)	$1,581,504.25
Cash	$8,259.68
Number of Positions	17
Last Trades (3)	09/10/18
Period	01/02/99 - 12/03/18
Sizing Method	% Portfolio Weight
Last Rebalanced (Every 13 Weeks)	09/10/18
Benchmark	S&P 500 (SPY)
Universe	All Fundamentals - USA
Ranking System	All-Stars: Piotroski

Quick Stats as of 12/3/2018

|	
Total Return	1,481.50%
Benchmark Return	224.95%
Active Return	1,256.55%
Annualized Return	14.87%
Annual Turnover	44.90%
Max Drawdown	-78.06%
Benchmark Max Drawdown	-55.19%
Overall Winners	(85/188) 45.21%
Sharpe Ratio	0.55
Correlation with S&P 500 (SPY)	0.59

Top Holdings

|	Ticker			Weight	Return	Shares	Value
1	EBR	3M	1Y	23.58%	223.38%	58,095.0	$372,969.90
2	KGC	3M	1Y	8.65%	19.79%	48,323.0	$136,754.09
3	KEP	3M	1Y	7.36%	-37.42%	8,769.0	$116,364.63
4	RDC	3M	1Y	6.38%	-12.53%	7,025.0	$100,879.00
5	PKX	3M	1Y	6.34%	-6.70%	1,746.0	$100,342.62
6	GNK	3M	1Y	5.92%	-12.98%	10,568.0	$93,632.48
7	XIN	3M	1Y	5.84%	-14.17%	21,626.0	$92,343.02
8	SDLP	3M	1Y	5.46%	-44.98%	31,287.0	$86,352.12
9	GEVO	3M	1Y	5.17%	-18.40%	28,502.0	$81,800.74
10	OSN	3M	1Y	4.93%	-21.26%	41,440.0	$77,907.20

View All

Recent Trades

Date	Type	Ticker			Shares	Price
09/10/18	BUY	YOGA	3M	1Y	73,520.0	$1.16
09/10/18	BUY	AYTU	3M	1Y	27,062.0	$3.17
09/10/18	SELL	AUO	3M	1Y	-36,393.0	$4.14
06/11/18	BUY	GEVO	3M	1Y	28,502.0	$3.50
06/11/18	SELL	RIG	3M	1Y	-5,175.0	$12.89
06/11/18	SELL	ORIG	3M	1Y	-6.3	$28.51
06/11/18	SELL	SEII	3M	1Y	-6,741.2	$3.48
06/11/18	SELL	RTKHQ^18	3M 1Y	-42,074.0	$0.00
03/12/18	BUY	BXE	3M	1Y	82,588.0	$1.17
03/12/18	BUY	OSN	3M	1Y	41,440.0	$2.36

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(2) Improved Piotroski model

SIMULATED PORTFOLIOS > UNCLASSIFIED
Piotroski + div + sharpe

| Summary | Re-Run | Holdings | Transactions | Trading System | Statistics | Charts |
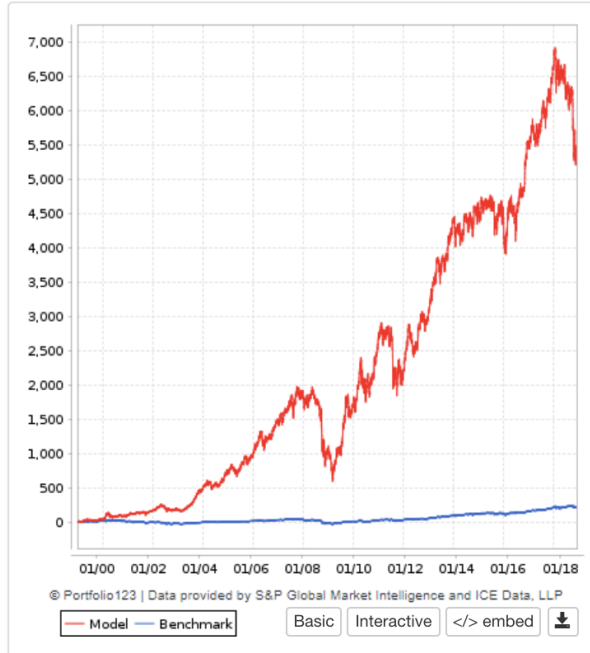
General Info

Total Market Value (inc. Cash)	$5,514,548.11
Cash	$45,108.50
Number of Positions	20
Last Trades (8)	09/10/18
Period	01/02/99 - 12/03/18
Sizing Method	% Portfolio Weight
Last Rebalanced (Every 13 Weeks)	09/10/18
Benchmark	S&P 500 (SPY)
Universe	All Fundamentals - USA
Ranking System	Piotroski + div + sharpe_final

Quick Stats as of 12/3/2018

Total Return	5,414.55%
Benchmark Return	224.95%
Active Return	5,189.59%
Annualized Return	22.30%
Annual Turnover	46.90%
Max Drawdown	-66.27%
Benchmark Max Drawdown	-55.19%
Overall Winners	(135/224) 60.27%
Sharpe Ratio	0.84
Correlation with S&P 500 (SPY)	0.62

Top Holdings

	Ticker		Weight	Return	Shares	Value
1	CEO	3M 1Y	6.82%	2.38%	2,164.0	$375,930.08
2	AGM	3M 1Y	6.81%	-1.91%	5,658.0	$375,408.30
3	ALL	3M 1Y	6.31%	26.61%	3,919.0	$347,850.44
4	JPM	3M 1Y	6.00%	109.73%	2,948.0	$330,883.52
5	PTR	3M 1Y	5.77%	-13.40%	4,392.0	$318,068.64
6	PKX	3M 1Y	5.59%	-30.12%	5,362.0	$308,154.14
7	AAN	3M 1Y	5.52%	22.99%	6,459.0	$304,412.67
8	SNP	3M 1Y	5.46%	-7.05%	3,417.0	$301,345.23
9	VOYA	3M 1Y	5.06%	1.52%	6,113.0	$278,936.19
10	TAIT	3M 1Y	4.91%	-16.41%	151,359.0	$270,932.61

View All

Recent Trades

Date	Type	Ticker		Shares	Price
09/10/18	BUY	TGA	3M 1Y	99,237.0	$3.25
09/10/18	BUY	RFP	3M 1Y	22,558.0	$14.35
09/10/18	BUY	TAIT	3M 1Y	151,359.0	$2.10
09/10/18	BUY	SNP	3M 1Y	3,417.0	$94.77
09/10/18	SELL	RE	3M 1Y	-1,387.0	$215.75
09/10/18	SELL	NTTYY	3M 1Y	-2,894.0	$43.46
09/10/18	SELL	AUO	3M 1Y	-94,815.0	$4.14
09/10/18	SELL	KB	3M 1Y	-9,078.0	$45.22
06/11/18	BUY	CEO	3M 1Y	2,164.0	$169.50
06/11/18	BUY	PTR	3M 1Y	4,392.0	$83.53

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3. Conclusion

In summary, we beat the Piotroski model by (5189% - 1256%) in the past 20 years of investment while having lower max drawdown than the Piotroski model. In addition, all the results are based on all fundamental universe, instead of S&P 500. Because if we trade on a broader range of stocks over the U.S., the potential stocks that could increase active return would be included in our portfolio, which could contribute to a higher alpha.