Fundamental Signals Strategy

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Background

The Fundamental Quality Anomaly

	Panel A: Long Sample (U.S., 1956 - 2012)					Panel B: Broad Sample (Global, 1986 - 2012)				
	QMJ	Profitability	Safety	Growth	Payout	QMJ	Profitability	Safety	Growth	Payout
Excess Returns	**0.40**	**0.27**	**0.23**	0.12	**0.31**	**0.38**	**0.34**	0.19	0.02	**0.38**
	(4.38)	(3.81)	(2.06)	(1.63)	(3.37)	(3.22)	(3.30)	(1.33)	(0.24)	(3.41)
CAPM-alpha	**0.55**	**0.33**	**0.42**	0.08	**0.46**	**0.52**	**0.43**	**0.34**	0.02	**0.49**
	(7.27)	(4.78)	(4.76)	(1.06)	(6.10)	(5.75)	(4.61)	(3.07)	(0.18)	(5.29)
3-factor alpha	**0.68**	**0.45**	**0.59**	**0.20**	**0.43**	**0.61**	**0.53**	**0.50**	0.14	**0.44**
	(11.10)	(7.82)	(8.68)	(3.32)	(6.86)	(7.68)	(6.11)	(5.40)	(1.92)	(5.17)
4-factor alpha	**0.66**	**0.53**	**0.57**	**0.38**	**0.21**	**0.45**	**0.49**	**0.39**	**0.29**	**0.19**
	(10.20)	(8.71)	(7.97)	(6.13)	(3.43)	(5.50)	(5.34)	(4.00)	(3.91)	(2.26)
MKT	**-0.25**	**-0.11**	**-0.34**	**0.05**	**-0.20**	**-0.24**	**-0.16**	**-0.28**	0.00	**-0.18**
	(-17.02)	(-8.08)	(-20.77)	(3.35)	(-14.47)	(-14.36)	(-8.33)	(-13.74)	(-0.06)	(-10.50)
SMB	**-0.38**	**-0.21**	**-0.41**	**-0.05**	**-0.30**	**-0.33**	**-0.20**	**-0.31**	**-0.18**	**-0.23**
	(-17.50)	(-10.21)	(-17.00)	(-2.53)	(-14.82)	(-9.46)	(-5.07)	(-7.48)	(-5.62)	(-6.58)
HML	**-0.12**	**-0.28**	**-0.23**	**-0.44**	**0.39**	-0.01	**-0.16**	**-0.22**	**-0.38**	**0.36**
	(-5.03)	(-12.16)	(-8.50)	(-18.81)	(16.68)	(-0.31)	(-3.95)	(-5.23)	(-11.62)	(9.89)
UMD	0.02	**-0.07**	0.01	**-0.17**	**0.21**	**0.15**	0.03	**0.10**	**-0.14**	**0.24**
	(0.82)	(-3.80)	(0.64)	(-8.55)	(10.79)	(5.54)	(1.01)	(3.07)	(-5.64)	(8.57)
Sharpe Ratio	0.58	0.51	0.27	0.22	0.45	0.62	0.63	0.26	0.05	0.66
Information Ratio	1.46	1.25	1.14	0.88	0.49	1.16	1.13	0.84	0.83	0.48
Adjusted R2	0.57	0.37	0.63	0.40	0.60	0.60	0.34	0.58	0.35	0.52

Quality Minus Junk

Asness, Frazzini, Pedersen (2013)

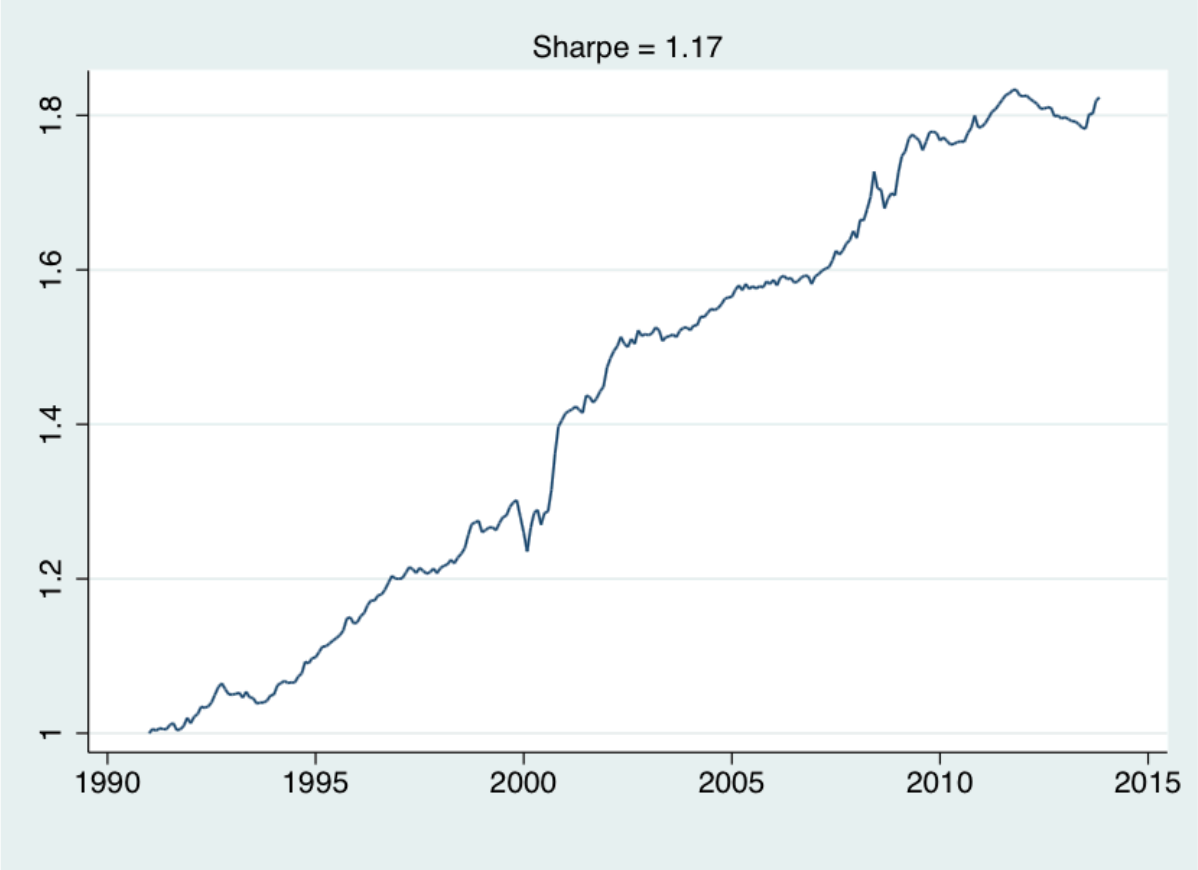
The Fundamental Quality Anomaly

	(1) Sharpe Ratio	(2) β	(3) β^-	(4) *Skewness*	(5) Proba $(r_t < -2\sigma)$	(6) Signal Persistence
Market - short rate	.47	1	1	-.13	.031	.
Low vol	.43	-.015	0	-.06	.032	.99
Book to Market	.2	.029	.11	.035	.025	.98
Repurchasers	.55	.01	.04	-.053	.019	.96
Momentum	.43	-.041	-.1	-.007	.025	.88
Industry Leaders	.48	-.016	-.14	.008	.029	.15
Accruals	.77	.014	-.027	.027	.018	.95
ROE	.55	-.025	-.033	.021	.01	.97
Cash-Flows	1.2	-.016	-.055	.06	.021	.97
ROA	.46	-.025	-.054	.08	.01	.99

The Excess Returns of "Quality" Stocks: A Behavioral Anomaly
Bouchaud, Cilberti, Landier, Simon, Thesmar (2016)

The Fundamental Quality Anomaly

Figure 1: Cumulative Return of a Quality Anomaly



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Defining “Quality”

$$Quality = z(Profitabiliy + Growth + Safety + Payout)$$

Profitability/Growth	Safety	Payout
GPOA	BAB	EISS
ROE	IVOL	DISS
ROA	LEV	NPOP
CFOA	O-Score	
GMAR	Z-Score	
ACC	EVOL	

Quantitative Warren Buffet: Quality at a Reasonable Price (QARP)

- *Quality − Value* vs. *Quality / Value*

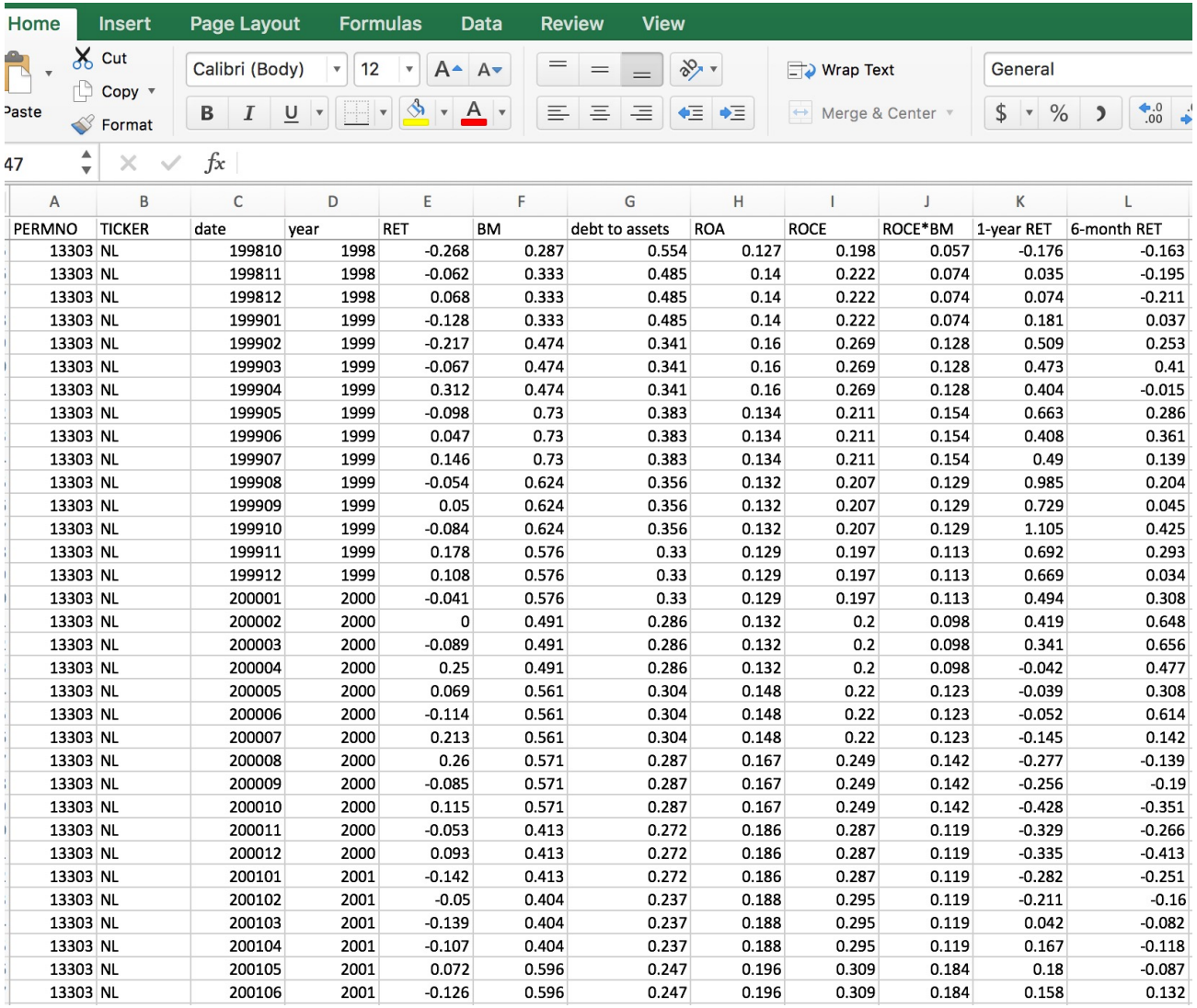
- The return of quality stocks varies over time with very high correlation to the “quality premium” paid

- Sharpe ratios of 0.7 and 0.9 for the US and Global stock universes were achieved using QARP

- How to define value?

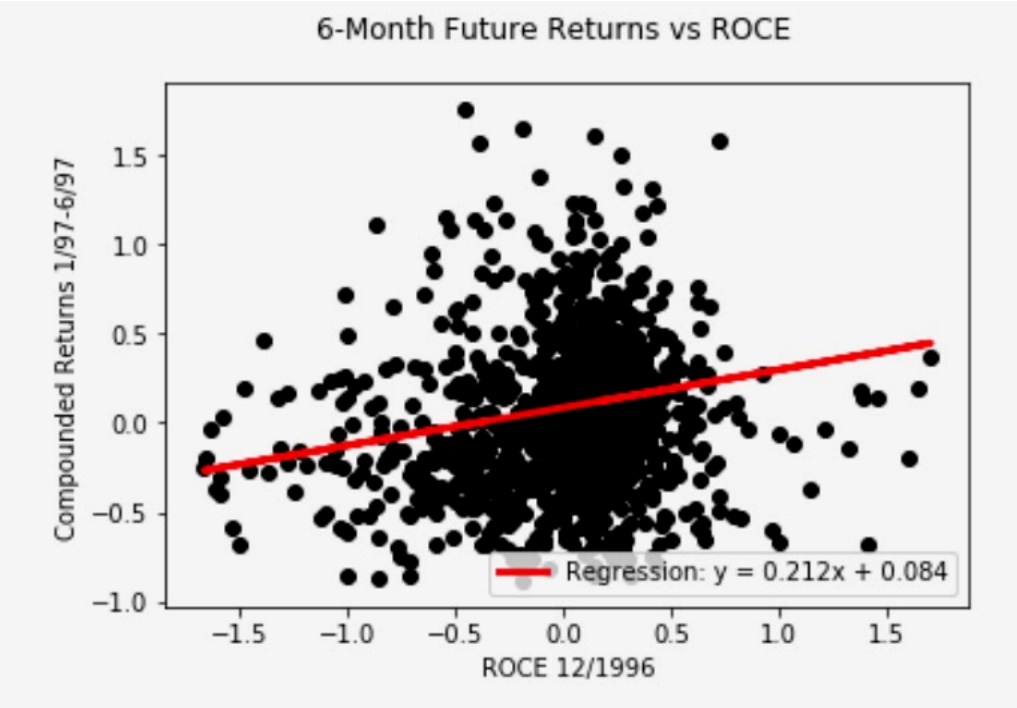
Our Project

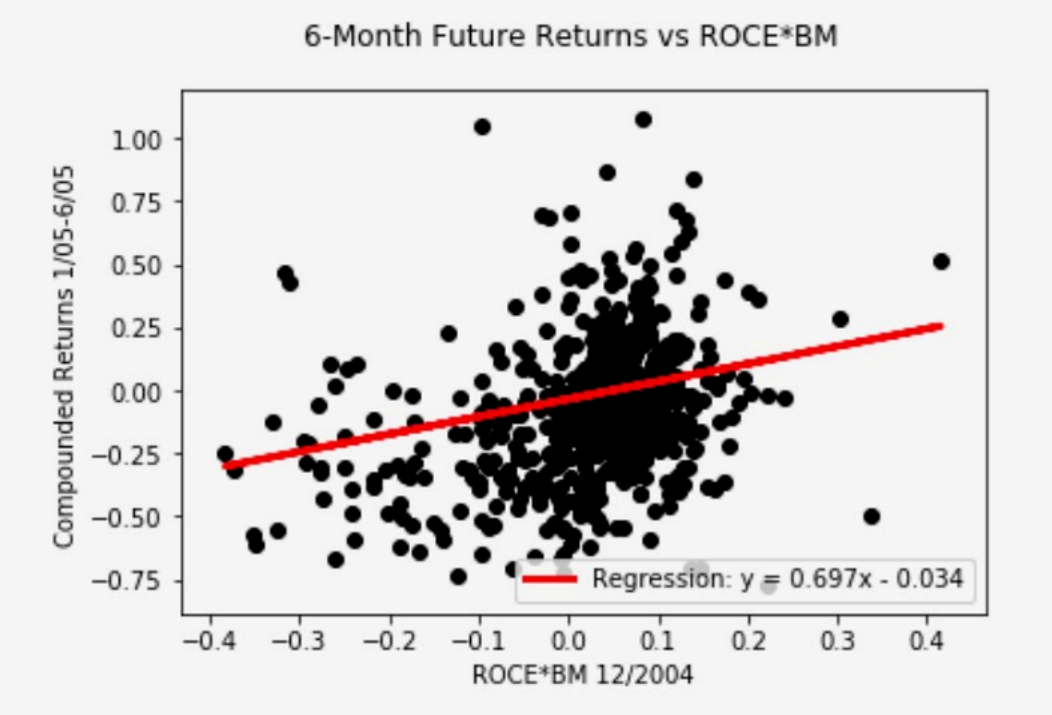
Research Dataset



A	B	C	D	E	F	G	H	I	J	K	L
PERMNO	TICKER	date	year	RET	BM	debt to assets	ROA	ROCE	ROCE*BM	1-year RET	6-month RET
13303	NL	199810	1998	-0.268	0.287	0.554	0.127	0.198	0.057	-0.176	-0.163
13303	NL	199811	1998	-0.062	0.333	0.485	0.14	0.222	0.074	0.035	-0.195
13303	NL	199812	1998	0.068	0.333	0.485	0.14	0.222	0.074	0.074	-0.211
13303	NL	199901	1999	-0.128	0.333	0.485	0.14	0.222	0.074	0.181	0.037
13303	NL	199902	1999	-0.217	0.474	0.341	0.16	0.269	0.128	0.509	0.253
13303	NL	199903	1999	-0.067	0.474	0.341	0.16	0.269	0.128	0.473	0.41
13303	NL	199904	1999	0.312	0.474	0.341	0.16	0.269	0.128	0.404	-0.015
13303	NL	199905	1999	-0.098	0.73	0.383	0.134	0.211	0.154	0.663	0.286
13303	NL	199906	1999	0.047	0.73	0.383	0.134	0.211	0.154	0.408	0.361
13303	NL	199907	1999	0.146	0.73	0.383	0.134	0.211	0.154	0.49	0.139
13303	NL	199908	1999	-0.054	0.624	0.356	0.132	0.207	0.129	0.985	0.204
13303	NL	199909	1999	0.05	0.624	0.356	0.132	0.207	0.129	0.729	0.045
13303	NL	199910	1999	-0.084	0.624	0.356	0.132	0.207	0.129	1.105	0.425
13303	NL	199911	1999	0.178	0.576	0.33	0.129	0.197	0.113	0.692	0.293
13303	NL	199912	1999	0.108	0.576	0.33	0.129	0.197	0.113	0.669	0.034
13303	NL	200001	2000	-0.041	0.576	0.33	0.129	0.197	0.113	0.494	0.308
13303	NL	200002	2000	0	0.491	0.286	0.132	0.2	0.098	0.419	0.648
13303	NL	200003	2000	-0.089	0.491	0.286	0.132	0.2	0.098	0.341	0.656
13303	NL	200004	2000	0.25	0.491	0.286	0.132	0.2	0.098	-0.042	0.477
13303	NL	200005	2000	0.069	0.561	0.304	0.148	0.22	0.123	-0.039	0.308
13303	NL	200006	2000	-0.114	0.561	0.304	0.148	0.22	0.123	-0.052	0.614
13303	NL	200007	2000	0.213	0.561	0.304	0.148	0.22	0.123	-0.145	0.142
13303	NL	200008	2000	0.26	0.571	0.287	0.167	0.249	0.142	-0.277	-0.139
13303	NL	200009	2000	-0.085	0.571	0.287	0.167	0.249	0.142	-0.256	-0.19
13303	NL	200010	2000	0.115	0.571	0.287	0.167	0.249	0.142	-0.428	-0.351
13303	NL	200011	2000	-0.053	0.413	0.272	0.186	0.287	0.119	-0.329	-0.266
13303	NL	200012	2000	0.093	0.413	0.272	0.186	0.287	0.119	-0.335	-0.413
13303	NL	200101	2001	-0.142	0.413	0.272	0.186	0.287	0.119	-0.282	-0.251
13303	NL	200102	2001	-0.05	0.404	0.237	0.188	0.295	0.119	-0.211	-0.16
13303	NL	200103	2001	-0.139	0.404	0.237	0.188	0.295	0.119	0.042	-0.082
13303	NL	200104	2001	-0.107	0.404	0.237	0.188	0.295	0.119	0.167	-0.118
13303	NL	200105	2001	0.072	0.596	0.247	0.196	0.309	0.184	0.18	-0.087
13303	NL	200106	2001	-0.126	0.596	0.247	0.196	0.309	0.184	0.158	0.132

The Quality Anomaly Illustrated





End Goals

Finding the Best QARP Signal

- Exploring specific quality and value fundamentals that are most predictive of high returns (high regression coefficient and high R^2)

- Combining them to create the most powerful overall signal

$$Quality = z(Profitabiliy + Growth + Safety + Payout)$$

How to improve individual and category weighting?

Finding the Right Quality Metrics

Profitability/Growth	Safety	Payout
GPOA	BAB	EISS
ROE	IVOL	DISS
ROA	LEV	NPOP
CFOA	O-Score	
GMAR	Z-Score	
ACC	EVOL	

and many more…

Portfolio Construction

- Portfolio can be made market-neutral, equal parts long and short, or long-only
- Benchmark of comparison will vary depending on this choice
- Since quality predicts outperformance, we plan to create a weighted-average portfolio based on our QARP signal

```
# Import Algorithm API functions
from quantopian.algorithm import (
    attach_pipeline,
    pipeline_output,
)

# Pipeline imports
from quantopian.pipeline import Pipeline
from quantopian.pipeline.data import Fundamentals
from quantopian.pipeline.filters import QTradableStocksUS

# Import Algorithm API functions
from quantopian.algorithm import order_optimal_portfolio

# Import Optimize API module
import quantopian.optimize as opt


def initialize(context):
    context.day_count = 0
    context.daily_message = "Day {}."
    context.weekly_message = "Time to place some trades!"

    # Attach pipeline to algorithm
    attach_pipeline(
        make_pipeline(),
        'data_pipe'
    )

    # Schedule rebalance function
    schedule_function(
        rebalance,
        date_rule=date_rules.every_day(),
        time_rule=time_rules.market_open()
    )

    # Constraint parameters
    context.max_leverage = 1
    context.max_pos_size = 0.05
    context.max_turnover = 10

def make_pipeline():
    base_universe = QTradableStocksUS()
    ROIC = Fundamentals.roa.latest
    PB_ratio = Fundamentals.pb_ratio.latest
    QARP = ROIC/PB_ratio
    return Pipeline(
        columns={
            'ROIC': ROIC,
            'PB_ratio': PB_ratio,
            'QARP': QARP
        },
        screen = base_universe
        & QARP.notnull()
        & (QARP > 0)
    )

def before_trading_start(context, data):
    # Get pipeline output and
    # store it in context
    context.output = pipeline_output('data_pipe')

def rebalance(context, data):
    # Create MaximizeAlpha objective using
    # sentiment_score data from pipeline output
    objective = opt.MaximizeAlpha(
      context.output.QARP
    )

    # Create position size constraint
    constrain_pos_size = opt.PositionConcentration.with_equal_bounds(
        -context.max_pos_size,
        context.max_pos_size
    )

    # Ensure long and short books
    # are roughly the same size
    dollar_neutral = opt.DollarNeutral()

    # Constrain target portfolio's leverage
    max_leverage = opt.MaxGrossExposure(context.max_leverage)
```

Quantopian backtesting pipeline

Separating Based on Industry

- Fundamentals also possess significant variability among industries
- Increased granularity should increase the signal power so long as we maintain a significant sample size
- Portfolio optimization amongst industry weightings would then yield a superior result