Behavioral Finance vs. Risk

The Case of the Size Premium

1. **Three possible explanations for all factors with positive means**

   - Data-mining
   - Compensation for risk consistent with EMH
   - Exploiting behavioral biases in a market that is not perfectly efficient

2. **Risk based stories in particular need**

   - A clear story for risk that is really risky!
     - High market beta? (CAPM)
     - Hurting you in states of the world that are particularly painful? (ICAPM)
     - Hurting you when the investment opportunity set gets worse? (ICAPM)
     - And risk stories have to be for portfolios not individual stocks

   - In particular, all-else-equal, the "better" the factor's returns (e.g., higher Sharpe ratio) the more challenging it is for risk-based explanations

   - Preview: This paper makes the already hard task of a risk-based story for the small firm effect much harder! Pendulum swinging to behavioral finance here.

Motivation

The Size Premium

1. **Banz (1981) found that small stocks in the U.S. have higher average returns than large stocks, a relation which is not accounted for by market beta**
2. **The size anomaly has become one of the focal points for discussions of market efficiency**
3. **The size factor has become one of the staples of current asset pricing models used in the literature**
   - E.g., Fama and French (1993, 2014)
4. **The size premium implies that small firms face larger costs of capital than large firms**
   - Important implications for corporate finance, incentives to merge and form conglomerates, and broader industry dynamics
5. **The size effect has had a large impact on investment practice:**
   - Spawning an entire category of investment funds
   - Giving rise to indices
   - Serving as a cornerstone for mutual fund classification

Seven Criticisms of the Size Anomaly

1. **It has a weak historical record**
   - Many papers find that the size effect is simply not very significant
   - E.g., Israel and Moskowitz (2013)

2. **It varies significantly over time, in particular weakening after its discovery in the early 1980s**
   - The size effect has disappeared since the early 1980s
   - E.g., Dichev (1998), Chan, Karceski, and Lakonishok (2000), Horowitz, Loughran, and Savin (2000), Amihud (2002), Schwert (2003) and Van Dijk (2011)

3. **It appears to be driven by "extreme" stocks**
   - Removing stocks with less than $5 million in market cap or smallest 5% of firms causes the small firm effect to vanish
   - E.g., Horowitz, Loughran, and Savin (2000), Crain (2011) and Bryan (2014)

4. **Predominantly resides in January**
   - Premium seems to be in January, particularly in the first few trading days of the year, and is largely absent the rest of the time
   - E.g., Reinganum (1981), Roll (1981), Keim (1983), Gu (2003), Easterday, Sen, and Stephan (2009)

Seven Criticisms of the Size Anomaly

Cont'd

5. **No premium is present for measures of size that do not rely on market prices**
   - Non-price based measures of size do not yield a relation between size and average returns
   - E.g., Berk (1995, 1997)

6. **Size premium is subsumed by proxies for illiquidity**
   - Size may just be a proxy for a liquidity effect
   - E.g. Brennan and Subrahmanyam (1996), Amihud (2002), Hou and Moskowitz (2005), Sadka (2006), Ibbotson, Chen, Kim, and Hu (2013) , Pastor and Stambaugh (2003), Acharya and Pedersen (2005)
   - Crain (2011) summarizes the evidence on size and liquidity

7. **Size premium is weak internationally**
   - The size anomaly is weaker and not very robust in international equity markets, and hence the size effect may possibly be the result of data mining
   - E.g., Crain (2011) and Bryan (2014)

What We Do

We define a security's "quality" as characteristics that, all-else-equal, an investor should be willing to pay a higher price for:

- Stocks that are safe, profitable, growing, and well managed

We control for quality using a whole host of "quality" measures proposed in the literature

- Profitability (Novy-Marx (2012))
- BAB (Frazzini and Pedersen (2013))
- Fama and French (2015) profitability and investment factors
- *Quality-Minus-Junk* (QMJ) factor proposed by Asness, Frazzini, and Pedersen (2014)
- Also look at sub-components based on profitability, profit growth, safety, and payout
- Equity returns to low minus high credit (Credit)

Put Simply

We examine the evidence on the size premium controlling for a security's quality

- We test whether the strong negative relation between size and quality explains the generally weak performance of the size effect and the other of the seven challenges

A Quick English Language Summary

- Small firms are very junky (low quality) and large firms high quality on a very robust set of quality measures
- The small firm effect has (weakly) existed even though it has always had to fight effectively shorting this strong set of quality factors
- Accounting for this short (i.e., the small firm effect tested as neutral to rather than short the quality factors) reveals an extremely strengthened size effect where small trounces large, and is not subject to any of the other seven major criticisms
- Marginal to the quality (and all other) factors small firms beat large firms by much much more than previous work has found
- Risk-based stories may make a come back, but look to be in some trouble

Summary of Results

1. **Size matters: controlling for quality, a significant size premium emerges**
   - Alpha = 5.9% per year, t-stat = 4.89 controlling for “quality” (QMJ)
   - vs. Alpha = 1.7% per year, t-stat 1.23 without quality control
   - Similar results for all measures of quality
2. **Stable through time and robust out of sample**
3. **Not concentrated in “extreme” stocks**
4. **More consistent across seasons and markets**
5. **Robust to non-price based measures of size**
6. **Not captured by an illiquidity premium**
7. **More consistent internationally**

Road Map

- **Defining quality and test portfolios**

Evidence: The size premium

Evidence: The size premium controlling for quality/junk

Conclusion

Defining Quality

Asness, Frazzini, and Pedersen (2014)

Gordon's growth model:

$$P = dividend/required\ return - growth$$

With very high tech math:

$$P/B = profit/B \times dividend/profit/required\ return - growth = profitability \cdot payout\ ratio/required\ return - growth$$

Defining Quality

Asness, Frazzini, and Pedersen (2014)

Gordon's growth model:

$$P/B = profitability \cdot payout\ ratio / required\ return - growth$$

Four quality measures:

- **Profitability:** Gross profits, margins, earnings, accruals and cash flows; and focus on each stock's average rank across these metrics

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Safety: We consider both return-based measures of safety (e.g., market beta and volatility) and fundamental-based measures of safety (e.g., stocks with low leverage, low volatility of profitability, and low credit risk)

Payout: Fraction of profits paid out to shareholders. This characteristic is determined by management and can be seen as a measure of shareholder friendliness (e.g., if free cash flow increases agency problems)

Data Sources and Portfolios

- **Data Sources**
  - Merged CRSP/ Xpressfeed Global, Common stocks
  - Long sample: U.S., 1956 – 2012
  - Broad sample: Global, 1986 – 2012, 24 Countries (MSCI Developed Markets)
- **Size: SMB (Small minus Big)**
  - Fama and French's SMB factors and a set of value-weighted decile portfolios based on market capitalization sorts
  - Source: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
  - We also compute non-price based SMBs (Total Assets, Employees , …)
- **Quality: QMJ (Quality minus Junk)**
  - Asness, Frazzini, and Pedersen (2014), formed by ranking stocks on measures of quality/junk based on their profitability, growth, safety, and payout
  - Source: https://www.aqr.com/library/data-sets

Related research:

- Fama and French (2014) RMW, CMA factors
- Frazzini and Pedersen (2014) BAB

Road Map

Defining quality and test portfolios

► **Evidence: The size premium**

Evidence: The size premium controlling for quality/junk

Conclusion

The Size Effect

1926 – 2012

This table reports summary statistics on the size premium over time. Returns are monthly.

		SMB			1 - 10 decile spread		
	Sample period	Mean	Stdev	*t*-stat	Mean	Stdev	*t*-stat
Longest sample	1926 - 2012	0.23%	3.26%	2.27	0.55%	7.69%	2.32
January		2.30%	3.26%	6.50	6.83%	8.41%	7.49
Feb. - Dec.		0.04%	3.19%	0.41	-0.01%	7.37%	-0.06
Banz (1981)	1936 - 1975	0.16%	2.83%	1.22	0.61%	7.34%	1.82
Pre-&Post-Banz (1981)	1926-1935; 1976-2012	0.29%	3.59%	1.92	0.50%	7.99%	1.49
BAB sample	1931 - 2012	0.29%	3.28%	2.78	0.67%	7.74%	2.73
FF 5-factor sample	1963 - 2012	0.25%	3.13%	1.95	0.33%	4.89%	1.66
Credit sample	1987 - 2012	0.14%	3.31%	0.74	0.16%	4.89%	0.56
Quality sample	1957 - 2012	0.22%	3.01%	1.93	0.33%	4.72%	1.80
Golden age	1957 - 1979	0.35%	2.87%	2.00	0.68%	4.80%	2.35
Embarrassment	1980 - 1999	-0.04%	2.66%	-0.23	-0.40%	4.12%	-1.49
Resurrection	2000 - 2012	0.42%	3.67%	1.41	0.82%	5.31%	1.92

Road Map

Defining quality and test portfolios

Evidence: The size premium

► **Evidence: The size premium controlling for quality/junk**

Conclusion

Results

Size Matters

Size matters: ***controlling for quality, a significant size premium emerges***

This table shows monthly returns and alphas of size-sorted portfolios

Panel A: Controlling for Quality/Junk

$$SMB_t = \alpha + \beta\, RMRF_t + \beta_{-1} RMRF_{t-1} + \mathrm{h} HML_t + \mathrm{m} UMD_t + \mathrm{qQ}^*{}_t + \varepsilon_t$$

	α	*t*(α)	β	*t*(β)	β_{-1}	*t*(β_{-1})	h	*t*(h)	m	*t*(m)	q	*t*(q)			R^2
Quality sample	**0.0012**	**1.12**	0.21	8.30											0.09
	0.0007	**0.63**	0.20	7.96	0.13	5.09									0.13
	0.0014	**1.23**	0.17	6.36	0.13	5.42	-0.16	-3.96	0.00	0.13					0.15
Q* = QMJ (2014)	**0.0049**	**4.89**	-0.04	-1.42	0.10	4.82	-0.24	-6.75	0.06	2.70	-0.74	-15.09			0.37
Q* = Profit	**0.0042**	**3.95**	0.06	2.36	0.11	5.07	-0.33	-8.04	0.03	1.24	-0.67	-10.98			0.28
Q* = Growth	**0.0020**	**1.80**	0.17	6.57	0.13	5.50	-0.27	-5.39	0.01	0.27	-0.26	-3.68			0.17
Q* = Safety	**0.0035**	**3.53**	-0.03	-1.12	0.10	4.82	0.20	4.61	0.05	1.98	-0.87	-14.94			0.36
Q* = Payout	**0.0044**	**4.60**	-0.12	-4.28	0.09	4.35	-0.28	-7.93	0.08	3.63	-0.70	-16.86			0.40
Q* = QMJ (2015)	**0.0051**	**4.88**	-0.03	-0.97	0.11	5.19	-0.39	-9.82	0.05	2.25	-0.74	-13.76			0.34
Fama and French sample											RMW		CMA		
	0.0016	**1.31**	0.17	6.13	0.14	5.33	-0.17	-3.87	0.01	0.52					0.16
Q* = RMW, CMA	**0.0033**	**2.82**	0.11	4.04	0.14	5.63	-0.09	-1.52	0.04	1.57	-0.54	-9.74	-0.15	-1.81	0.28
BAB sample															
	0.0007	**0.72**	0.19	10.09	0.13	7.54	0.03	1.09	-0.01	-0.28					0.17
Q* = BAB	**0.0023**	**2.50**	-0.13	-4.77	0.14	8.85	0.01	0.24	0.07	3.39	-0.42	-14.85			0.33
Credit sample															
	0.0005	**0.27**	0.11	2.77	0.13	3.39	-0.31	-5.23	0.04	1.15					0.17
Q* = Cred	**0.0035**	**2.12**	0.04	1.13	0.08	2.10	-0.28	-5.02	0.07	2.15	-0.12	-7.82			0.31

QMJ Period (1957:07 – 2012:12); FF period (1963:07 – 2012:12); BAB period (1931:01 – 2012:12); Credit period (1987:07 – 2012:12)

Results

Size Matters

Size matters: ***controlling for multiple measures of quality, a significant size premium emerges***

This table shows monthly returns and alphas of size-sorted portfolios

Panel B: Multiple Measures of Quality/Junk

$$SMB_t = \alpha + \beta\, RMRF_t + \beta_{-1} RMRF_{t-1} + \mathrm{h} HML_t + \mathrm{m} UMD_t + \mathrm{r} RMW_t + \mathrm{c} CMA_t + qQMJ_t + \mathrm{b} BAB_t + \mathrm{d} Cred_t + \varepsilon_t$$

	α	*t*(α)	β	*t*(β)	β_{-1}	$t(\beta_{-1})$	h	*t*(h)	m	*t*(m)	r	*t*(r)	c	*t*(c)	q	*t*(q)	b	*t*(b)	d	*t*(d)	R^2
Fama and French sample	**0.0047**	**4.36**	-0.16	-4.69	0.10	4.62	-0.18	-3.06	0.11	4.29	0.08	0.96	0.09	1.15	-0.64	-6.64	-0.24	-5.61			0.41
Credit sample	**0.0047**	**3.12**	-0.28	-5.39	0.04	1.25	-0.17	-2.09	0.18	5.46	0.00	0.02	0.12	1.14	-0.43	-3.00	-0.30	-5.36	-0.06	-3.81	0.50

Panel C: Controlling for Quality/Junk Over Time

$$SMB_t = \alpha + \beta\, RMRF_t + \beta_{-1} RMRF_{t-1} + \mathrm{h} HML_t + \mathrm{m} UMD_t + \mathrm{qQ}^*_t + \varepsilon_t$$

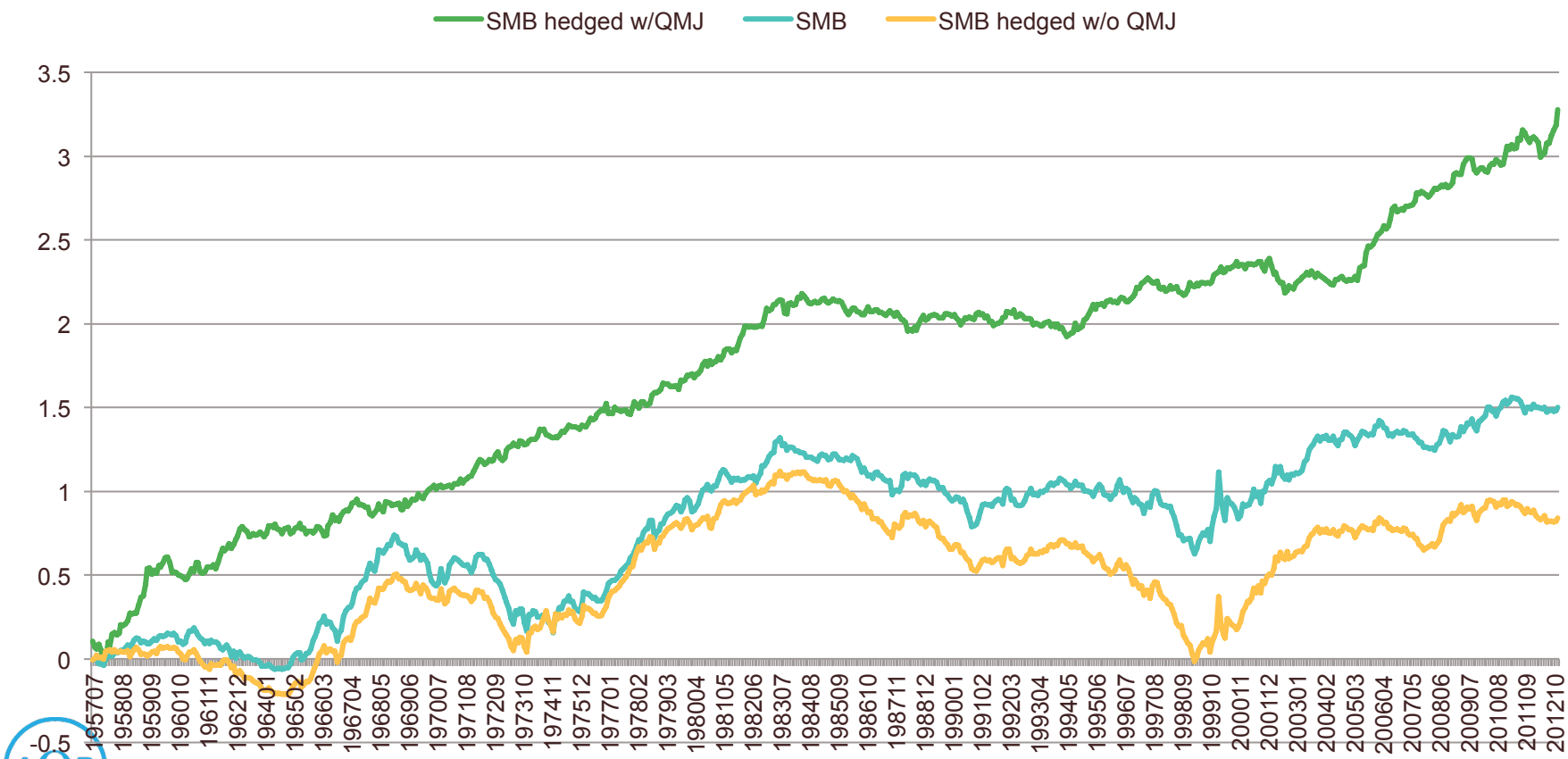
	α	*t*(α)	β	*t*(β)	β_{-1}	$t(\beta_{-1})$	h	*t*(h)	m	*t*(m)	q	*t*(q)	R^2
Q* = QMJ													
Golden age	**0.0025**	**1.52**	0.27	7.19	0.15	4.10	0.07	0.95	-0.09	-1.83			0.24
	0.0057	**4.00**	0.07	1.96	0.14	4.70	-0.24	-3.73	-0.06	-1.39	-0.97	-10.73	0.48
Embarrassment	**-0.0011**	**-0.64**	0.04	0.97	0.18	5.05	-0.24	-3.56	-0.08	-1.63			0.18
	0.0050	**3.06**	-0.14	-3.43	0.15	4.85	-0.42	-6.84	-0.06	-1.34	-0.83	-9.08	0.40
Resurrection	**0.0054**	**2.06**	0.25	4.25	0.10	1.75	-0.34	-4.46	0.14	3.00			0.25
	0.0089	**4.04**	-0.17	-2.43	-0.03	-0.59	-0.18	-2.68	0.17	4.43	-0.84	-8.40	0.49

Results

Size Matters

Controlling for quality, the premium is *stable through time and robust out of sample*

The figure plots the cumulative sum of returns over time of (i) SMB hedged with QMJ, (ii) SMB unhedged, (iii) SMB hedged but without QMJ



Optimal Portfolios want Size *and* Quality

Mean-variance optimal portfolio weights of size and quality with and without each other and in presence of value and momentum.

RMRF	SMB	QMJ	Corr with SMB	SR
1.00			0.31	0.38
0.32		0.68	-0.28	0.91
0.59	0.41		0.64	0.40
0.19	0.24	0.57	0.24	1.09

RMRF	SMB	HML	UMD	QMJ	Corr with SMB	SR
0.25		0.44	0.31		0.03	1.08
0.23		0.28	0.14	0.35	-0.27	1.36
0.20	0.12	0.41	0.27		0.23	1.11
0.16	0.17	0.22	0.08	0.36	0.16	1.57

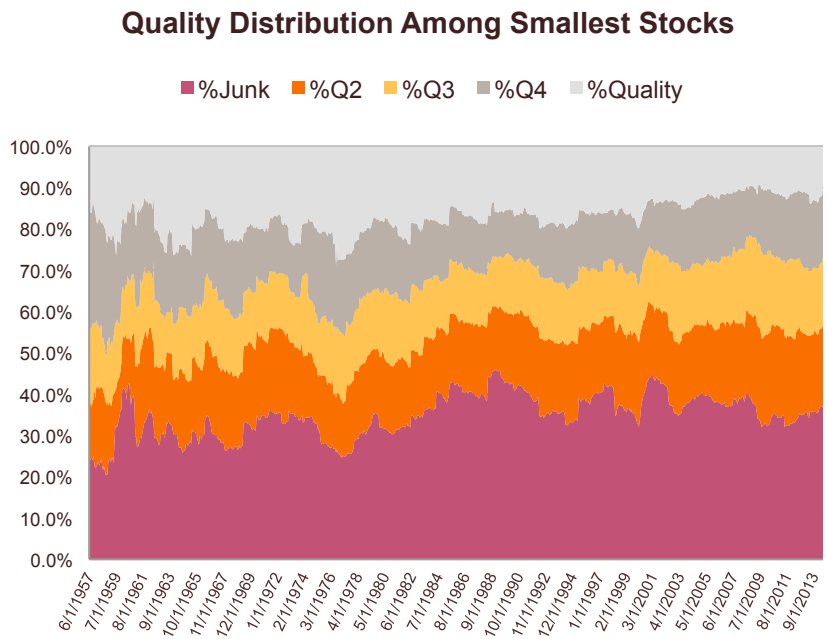
Bottom panel: Adding SMB to RMRF/HML/UMD only raises SR by 0.03, adding it to RMRF/HML/UMD/QMJ raises Sharpe by 0.19

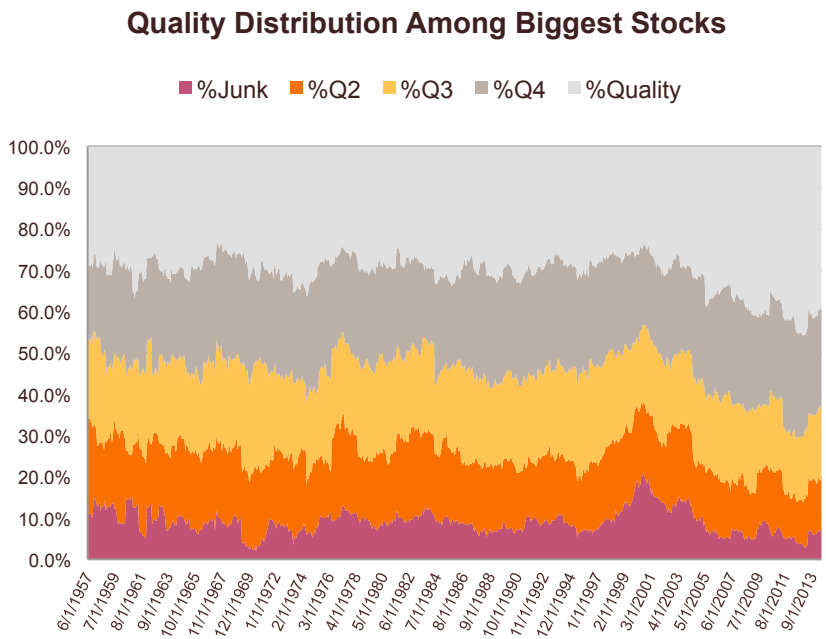
Results

Why Size Matters After Controlling for Quality

Distribution of quality/junk among large and small stocks

- Large stocks are typically high quality and small stocks more junky
- These characteristics drive the strong negative relation between size and quality and the return difference of quality vs. junk stocks chiefly explain the sporadic performance of the size premium



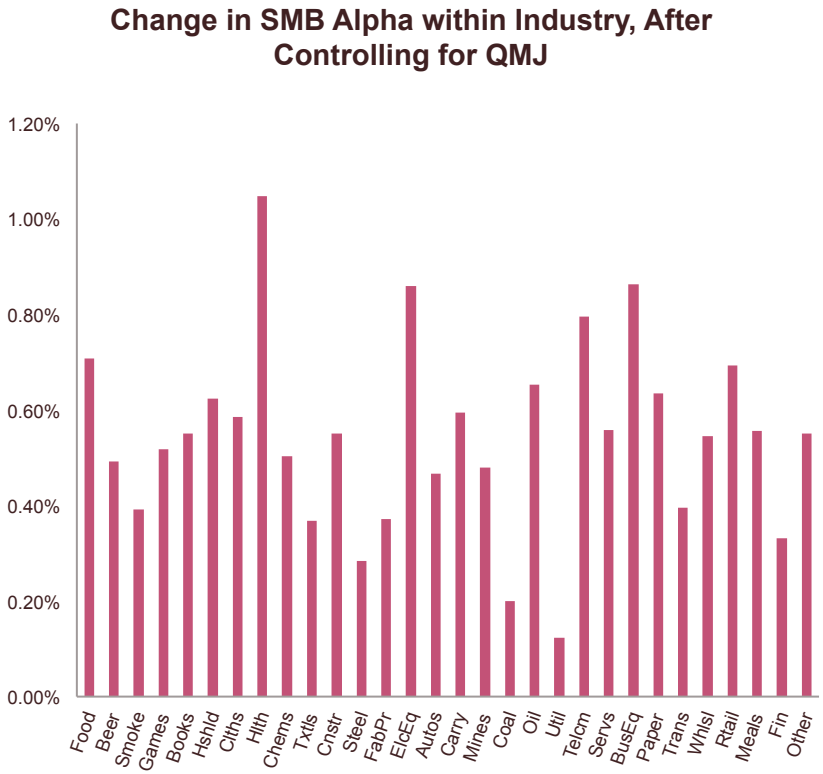


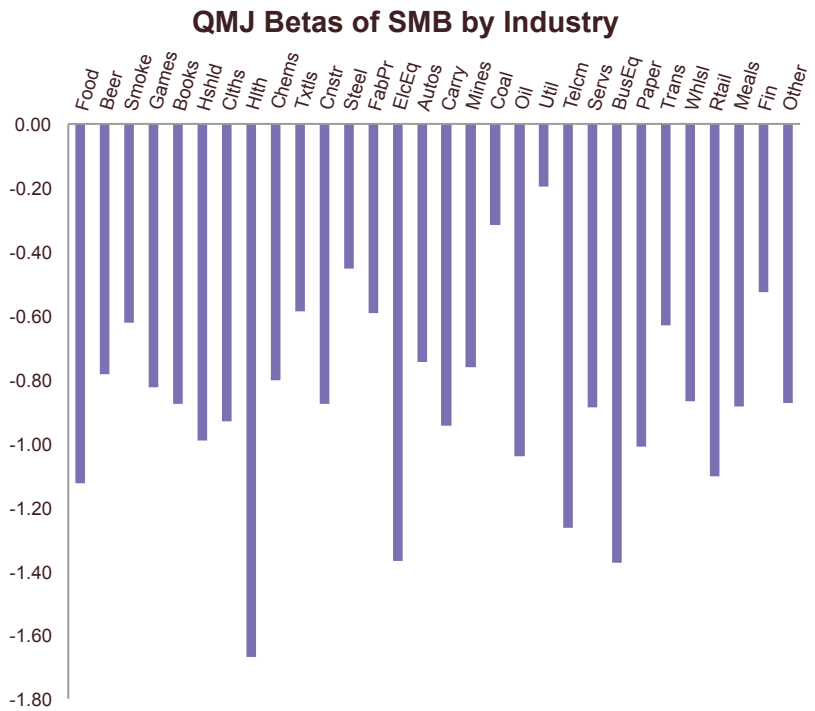
Results

Size Matters in Each Industry

Controlling for quality, the size premium is *robust to the specification*

This figure plots the improvement in SMB alphas (relative to the Fama and French factors market, market lagged a month, HML, and UMD) after controlling for QMJ within 30 industries





Results

Many Sizes Matter

Controlling for quality, the size premium is *robust to non-price based measures of size*

The table reports regression results for the P1-P10 value-weighted spread portfolios sorted using non-priced based measures of size

$$\mathrm{P1}-\mathrm{P10}_t = \alpha + \beta\, RMRF_t + \beta_{-1} RMRF_{t-1} + \mathrm{h} HML_t + \mathrm{m}\, UMD_t + qQMJ_t + \varepsilon_t$$

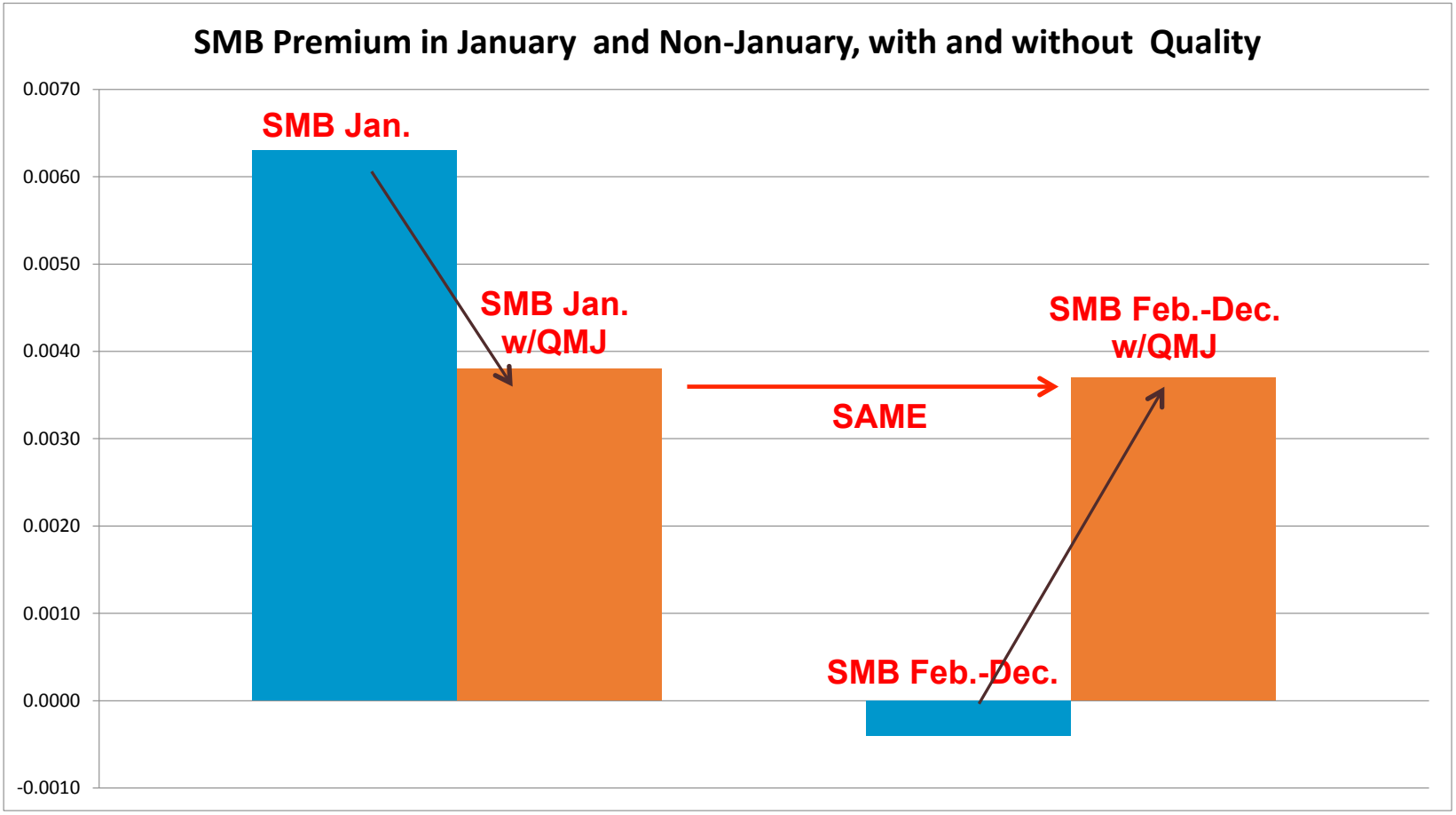
	Size measure:	Book assets		Sales		Book equity		PP&E		Employees	
		α	*t*(α)	α	*t*(α)	α	*t*(α)	α	*t*(α)	α	*t*(α)
Quality sample	No control for quality (q = 0)	0.0017	0.96	0.0002	0.10	0.0004	0.22	0.0008	0.00	0.0000	0.01
	Control for Quality (q ≠ 0)	0.0083	5.98	0.0067	5.52	0.0066	4.98	0.0058	4.57	0.0068	5.78
Golden age	No control for quality (q = 0)	0.0037	1.52	0.0023	1.04	0.0028	1.06	0.0041	1.84	0.0019	1.00
	Control for Quality (q ≠ 0)	0.0084	3.97	0.0062	3.43	0.0083	3.76	0.0083	4.27	0.0055	3.27
Embarrassment	No control for quality (q = 0)	-0.0016	-0.63	-0.0033	-1.34	-0.0048	-1.95	-0.0020	-0.83	-0.0035	-1.40
	Control for Quality (q ≠ 0)	0.0094	4.15	0.0086	4.37	0.0065	3.19	0.0072	3.24	0.0087	4.41
Resurrection	No control for quality (q = 0)	0.0053	1.38	0.0027	0.75	0.0057	1.71	0.0013	0.41	0.0038	1.07
	Control for Quality (q ≠ 0)	0.0115	3.98	0.0088	3.55	0.0112	4.66	0.0056	2.19	0.0102	4.13

Results

Size Matters Through the Year

Controlling for quality, the size premium is *more consistent across seasons*

This figure plots SMB returns in and out side of January with and without controlling for Quality.

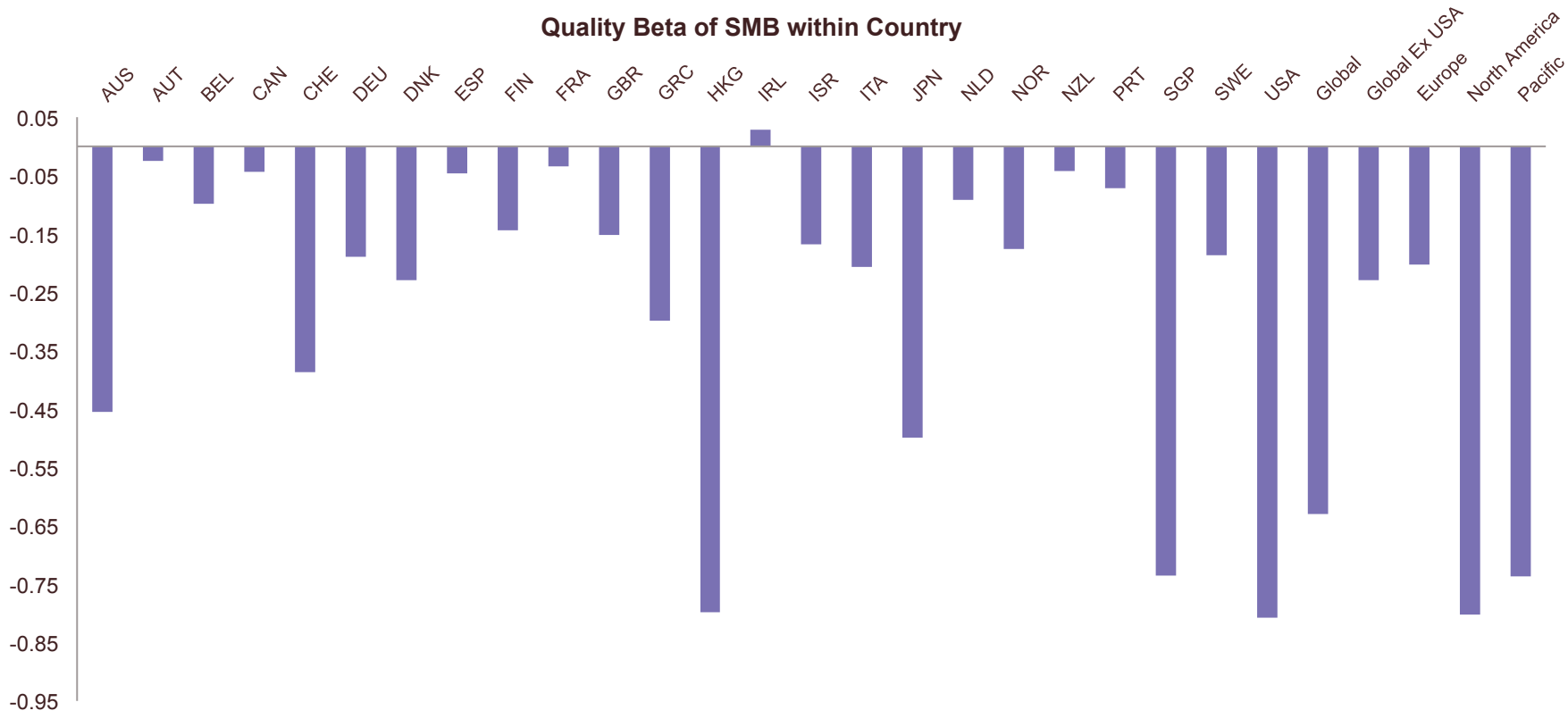


Results

Size Matters Globally

Controlling for quality, the size premium is *more consistent across markets*

This figure plots loadings of SMB alphas on QMJ within 24 developed markets

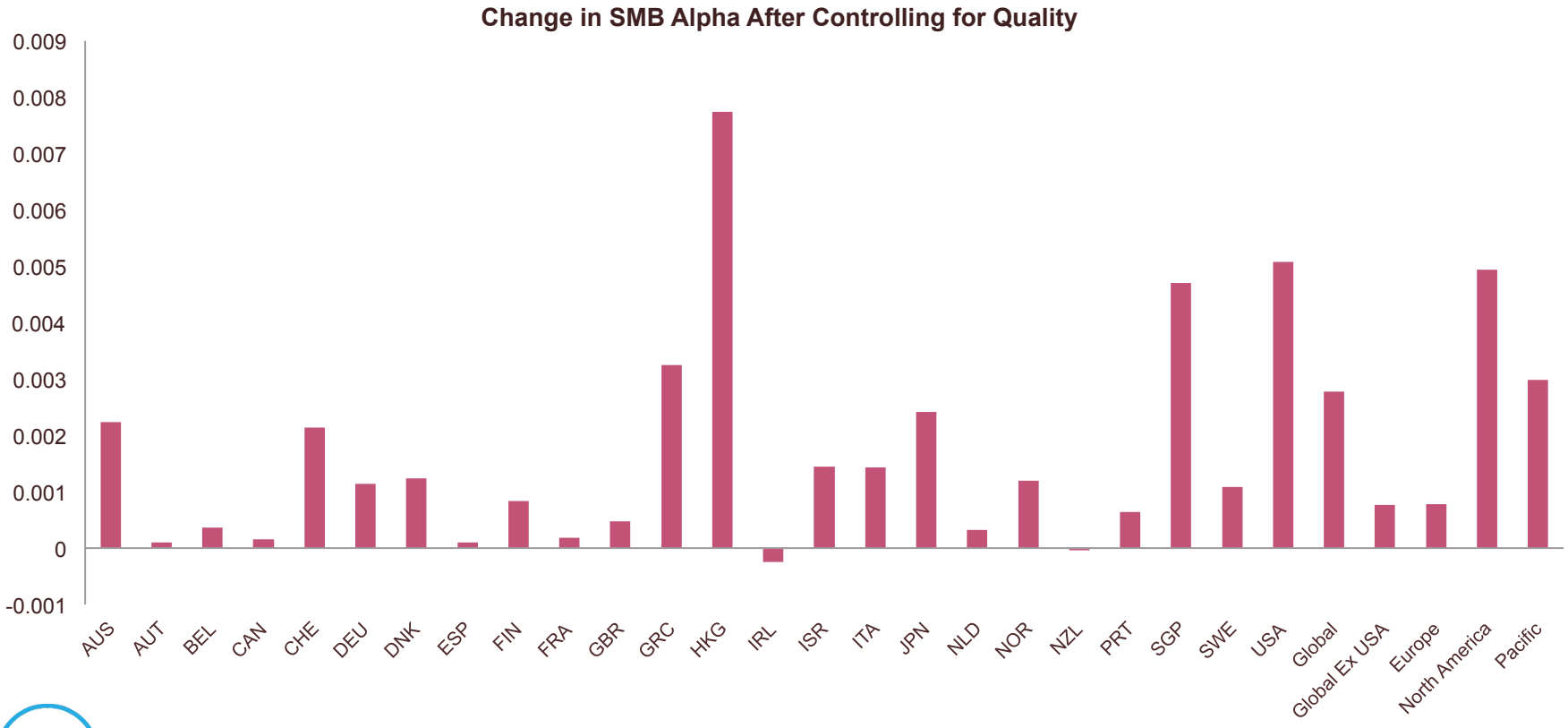


Results

Size Matters Globally

Controlling for quality, the size premium is *more consistent across markets*

This figure plots the improvement in SMB alphas (relative to the Fama and French factors market, market lagged a month, HML, and UMD) after controlling for QMJ

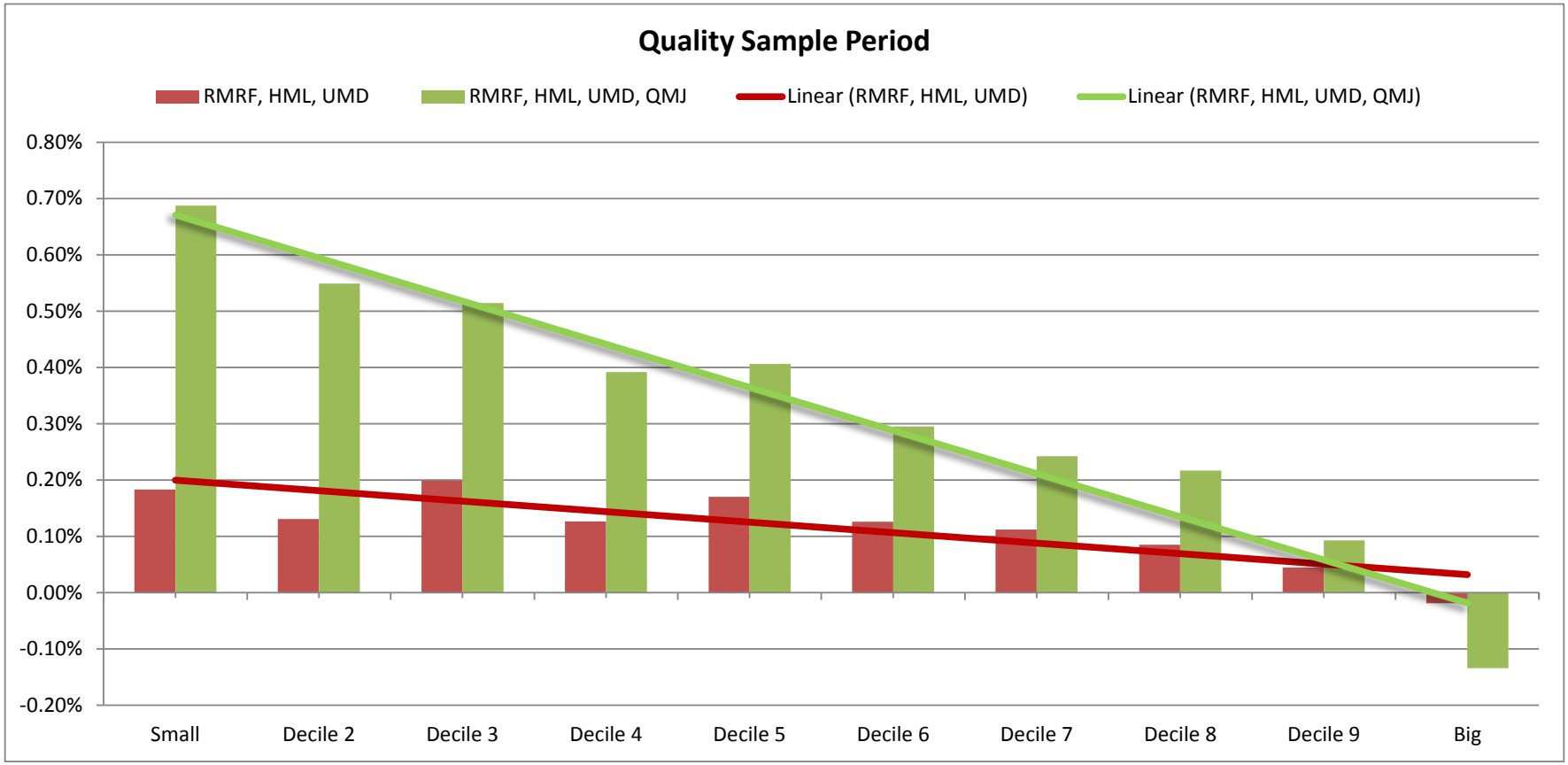


Results

Size Matters Not Just in the Extremes

Controlling for quality, the size premium is *not concentrated in "extreme" stocks*

This figure plots alphas of each size decile with respect to three factor models



Results

Size Matters Beyond Liquidity

Controlling for quality, the size premium is *not captured by an illiquidity premium*

The table reports regression results for the size premium, SMB, on the factors RMRF, its lagged value, HML, UMD, and various proxies for liquidity and liquidity risk

Panel A: Adding Liquidity

$$SMB_t = \alpha + \beta\, RMRF_t + \beta_{-1} RMRF_{t-1} + h HML_t + m UMD_t + l_1 LIQRISK_t + l_2 STREV_t + l_3 LIQ_t + q QMJ_t + \varepsilon_t$$

	α	*t*(α)	β	*t*(β)	β_{-1}	$t(\beta_{-1})$	h	*t*(h)	m	*t*(m)	l_1	$t(l_1)$	l_2	$t(l_2)$	l_3	$t(l_3)$	q	*t*(q)	R^2
Liquidity sample	0.0012	0.95	0.16	5.39	0.14	5.18	-0.18	-4.00	0.00	-0.16									0.16
	0.0006	0.42	0.09	2.77	0.16	5.74	-0.12	-2.63	0.01	0.39	-0.04	-1.22	0.11	2.72	0.14	3.89			0.19
	0.0047	3.90	-0.09	-2.76	0.11		-0.24	-5.77	0.07	2.69	-0.02	-0.79	0.08	2.26	0.04	1.40	-0.71	-12.89	0.38
January	0.0048	0.91	0.14	1.68	0.25	2.04	0.31	2.68	-0.27	-3.56									0.38
	0.0039	0.68	0.10	1.00	0.25	1.96	0.33	2.71	-0.20	-1.54	0.06	0.68	0.11	0.55	0.16	1.38			0.41
	0.0012	0.22	-0.01	-0.14	0.12	0.98	0.21	1.70	-0.14	-1.20	0.03	0.39	0.05	0.29	0.08	0.75	-0.65	-2.77	0.52
Feb.-Dec.	-0.0003	-0.22	0.14	4.65	0.14	5.25	-0.27	-5.56	0.04	1.32									0.20
	-0.0005	-0.35	0.09	2.63	0.16	5.81	-0.21	-4.14	0.04	1.43	-0.06	-1.69	0.05	1.23	0.12	3.42			0.22
	0.0043	3.48	-0.09	-2.76	0.12	5.20	-0.32	-7.06	0.09	3.31	-0.04	-1.16	0.04	1.18	0.03	1.05	-0.69	-12.04	0.40
Golden age	0.0035	1.45	0.31	6.19	0.19	3.95	0.13	1.42	-0.18	-2.85									0.36
	0.0008	0.31	0.16	2.55	0.19	4.17	0.19	2.06	-0.18	-2.63	-0.06	-0.75	0.30	3.07	0.24	2.68			0.43
	0.0044	1.92	0.00	0.02	0.18	4.51	-0.19	-1.95	-0.09	-1.44	0.09	1.26	0.20	2.27	0.12	1.49	-0.88	-6.47	0.56
Embarrassment	-0.0011	-0.64	0.04	0.97	0.18	5.05	-0.24	-3.56	-0.08	-1.63									0.18
	-0.0002	-0.12	0.03	0.61	0.17	4.73	-0.22	-3.12	-0.07	-1.20	-0.18	-3.85	0.02	0.21	-0.02	-0.42			0.23
	0.0051	3.05	-0.15	-3.67	0.14	4.57	-0.40	-6.20	-0.02	-0.51	-0.14	-3.38	0.07	1.10	-0.01	-0.22	-0.80	-8.84	0.43
Resurrection	0.0054	2.06	0.25	4.25	0.10	1.75	-0.34	-4.46	0.14	3.00									0.25
	0.0062	2.49	0.04	0.57	0.12	2.19	-0.14	-1.73	0.11	2.61	0.04	0.62	0.02	0.39	0.34	4.94			0.36
	0.0087	3.98	-0.25	-3.37	-0.01	-0.17	-0.07	-1.01	0.15	3.95	0.06	1.14	0.01	0.27	0.20	3.20	-0.74	-7.27	0.53

Road Map

Defining quality and test portfolios

Evidence: The size premium

Evidence: The size premium controlling for quality/junk

► **Conclusion**

Conclusions

We find that controlling for a security's quality unlocks a large and significant size premium

- Quality minus Junk has a very positive E[r] (alone or with standard risk adjustments)
- Small is junky vs. large very consistently (time, calendar, industry, geography)

When controlling for quality, the size premium is (2.–7. from earlier):

2. Stable through time and robust out of sample
3. Not concentrated in "extreme" stocks
4. More consistent across seasons and markets
5. Robust to non-price based measures of size
6. Not captured by an illiquidity premium
7. More consistent internationally

Our results make risk-based explanations for the size effect more challenging

- High Sharpe ratio, e.g., Hansen and Jagannathan (1997)
- It is the low-volatility, high-quality stocks that drive the high expected returns (no ICAPM)
- The size effect has always presented a challenge to theory, the challenge just got bigger
- In other words, as of now (it ain't over), we'd view our results as pro-behavioral vs. risk-based explanations

Appendix

Size, Quality and Trading Costs

5 x 5 size and quality portfolios (independent sorts)

Price impact model is Frazzini, Israel, and Moskowitz (2015)

	Small	1	2	3	Big
	Panel A: % Bid/Ask Spread				
Junk	3.1%	0.9%	0.3%	0.2%	0.1%
1	3.4%	1.0%	0.3%	0.2%	0.1%
2	3.8%	1.1%	0.3%	0.1%	0.1%
3	3.4%	1.2%	0.3%	0.1%	0.1%
Quality	2.5%	1.2%	0.3%	0.1%	0.1%

	Small	1	2	3	Big
	Panel B: Share Turnover (daily)				
Junk	0.5%	0.6%	0.8%	1.1%	1.3%
1	0.3%	0.4%	0.6%	0.9%	1.0%
2	0.2%	0.3%	0.6%	0.8%	0.9%
3	0.2%	0.3%	0.6%	0.8%	0.8%
Quality	0.2%	0.3%	0.6%	0.9%	0.9%

	Small	1	2	3	Big
	Panel C: Market Impact Cost per dollar traded (bps)*				
Junk	33.98	20.46	15.50	12.47	6.61
1	35.76	21.10	15.51	12.09	5.70
2	38.15	21.74	15.49	12.08	4.88
3	36.43	22.34	15.56	12.02	4.50
Quality	33.04	22.14	15.58	11.89	4.42

	Small	1	2	3	Big
	Panel D: Portfolio Turnover (one-sided)				
Junk	72.9%	74.0%	73.8%	71.7%	74.6%
1	80.2%	83.0%	81.6%	76.6%	73.5%
2	81.8%	83.1%	79.4%	76.0%	68.6%
3	76.7%	78.1%	77.7%	73.3%	64.4%
Quality	73.8%	70.5%	66.3%	57.4%	25.7%

	Small	1	2	3	Big
	Panel E: Total Trading Cost (bps/year)*				
Junk	24.78	15.14	11.45	8.93	4.93
1	28.66	17.51	12.65	9.26	4.19
2	31.19	18.06	12.29	9.19	3.35
3	27.96	17.45	12.09	8.80	2.90
Quality	24.39	15.60	10.33	6.82	1.13

	Small	1	2	3	Big
	Panel F: Net Returns (per month)*				
Junk	0.10%	0.27%	0.33%	0.31%	0.07%
1	0.55%	0.55%	0.55%	0.47%	0.33%
2	0.56%	0.59%	0.61%	0.50%	0.30%
3	0.61%	0.69%	0.64%	0.68%	0.44%
Quality	0.73%	0.74%	0.73%	0.71%	0.52%