Quality Minus Junk

Clifford S. Asness, Andrea Frazzini, and Lasse H. Pedersen*

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Abstract

We define a *quality* security as one that has 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. High-quality stocks do have higher prices on average, but not by a very large margin. Perhaps because of this puzzlingly modest impact of quality on price, high-quality stocks have high risk-adjusted returns. Indeed, a quality-minus-junk (QMJ) factor that goes long high-quality stocks and shorts low-quality stocks earns significant risk-adjusted returns in the U.S. and globally across 24 countries. The price of quality – i.e., how much investors pay extra for higher quality stocks – varies over time, reaching a low during the internet bubble. Further, a low price of quality predicts a high future return of QMJ. Finally, controlling for quality resurrects the otherwise moribund size effect.

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* Andrea Frazzini is at AQR Capital Management, Two Greenwich Plaza, Greenwich, CT 06830, e-mail: andrea.frazzini@aqr.com; web: http://www.econ.yale.edu/~af227/. Cliff Asness is at AQR Capital Management, Two Greenwich Plaza, Greenwich, CT 06830. Lasse H. Pedersen is at New York University, Copenhagen Business School, AQR Capital Management, CEPR and NBER, 44 West Fourth Street, NY 10012-1126; e-mail: lpederse@stern.nyu.edu; web: http://www.stern.nyu.edu/~lpederse/. We thank Antti Ilmanen, Ronen Israel, Johnny Kang, John Liew, Toby Moskowitz, Per Olsson, and Scott Richardson for helpful comments and discussions as well as participants in the SIFR Institute of Financial Research Conference on Re-Thinking Beta.

When did our field stop being "asset pricing" and become "asset expected returning?" … Market-to-book ratios should be our left-hand variable, the thing we are trying to explain, not a sorting characteristic for expected returns.

– Cochrane, Presidential Address, American Finance Association, 2011

The asset pricing literature in financial economics studies the drivers of returns, but, while linked, the economic consequences of market efficiency ultimately depend on prices, not returns, as emphasized by Summers (1986) and Cochrane (2011). Do the highest quality firms command the highest price so that these firms can finance their operations and invest?

To address this question, we define *quality* as characteristics that investors should be willing to pay a higher price for, everything else equal. We show that quality is priced, that is, investors pay more for firms with higher quality characteristics. However, the explanatory power of quality for prices is limited, presenting a puzzle for asset pricing. This puzzle for asset *prices* is analogous to the famous puzzle of the low R^2 of asset *returns* presented by Roll (1984, 1988). Consistent with the limited pricing of quality, high-quality stocks have historically delivered high risk-adjusted returns while low-quality *junk* stocks delivered negative risk-adjusted returns. Hence, a *quality-minus-junk* (QMJ) portfolio that invests long quality stocks and shorts junk stocks produces high risk-adjusted returns. Further, we find that the price of quality (the marginal amount extra investors pay for higher quality characteristics) has varied over time as the market has sometimes put a larger or smaller price premium on quality stocks vs. junk stocks. For instance, the price of quality was particularly low during the internet bubble. Since prices and returns are linked, the price of quality predicts the future return to the QMJ factor. Lastly, we show that QMJ has broader asset pricing implications, including resurrecting the size effect.

To apply the general definition of quality, we must identify stock characteristics that should command a higher price. Gordon's growth model presents a simple framework to get intuition for the natural quality characteristics. Indeed, rewriting Gordon's growth model, we can express a stock's price-to-book value (*P/B*) as follows:[1]

$$\frac{P}{B} = \frac{\text{profitability} \cdot \text{payout-ratio}}{\text{required-return} - \text{growth}} \tag{1}$$

We scale prices by book values to make them more stationary over time and in the cross section. The four right-hand side variables form the basis for our definition of quality. These variables are intuitive and extend beyond the Gordon model in terms of their relevance for stock prices.[2] For each quality characteristic, we consider several measures in order to have a robust analysis and ensure that the explanatory power of quality on price (or the lack thereof) is not driven by a specific measurement choice:

i. **Profitability.** Profitability is the profits per unit of book value. All else equal, more profitable companies should command a higher stock price. We measure profits in several ways, including gross profits, margins, earnings, accruals and cash flows, and focus on each stock's average rank across these metrics.

ii. **Growth.** Investors should also pay a higher price for stocks with growing profits. We measure growth as the prior five-year growth in each of our profitability measures.

iii. **Safety.** Investors should also pay, all-else-equal, a higher price for a stock with a lower required return, that is, a safer stock. What should enter into required return is still a very contentious part of the literature. We do not attempt to resolve those issues here, rather we take a simple common sense approach. We consider both return-based measure of safety (e.g., market beta and volatility) and fundamental-based measures

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[1] We rewrite the Gordon model simply as $\frac{P}{B} = \frac{1}{B}\frac{\text{dividend}}{\text{required-return}-\text{growth}} = \frac{\text{profit/B} \times \text{dividend/profit}}{\text{required-return}-\text{growth}}$.

[2] Equation (1) is a special case of the general present-value relation. We use the Gordon model to simplify notation but the same intuition applies to the general present-value relation.

of safety (e.g., stocks with low leverage, low volatility of profitability, and low credit risk).

iv. **Payout.** The payout ratio is the fraction of profits paid out to shareholders. This characteristic is determined by management and can be seen as a measure of shareholder friendliness. Management's agency problems are diminished if free cash flows are reduced through higher dividends (Jensen (1986)). We also consider both net payout as well as issuance (dilution). Payout is an example of how each of these measures is about their marginal effect, all else being equal. Indeed, if a higher payout is associated with a lower future profitability or growth, then this should not command a higher price, but a higher payout should be positive when we hold all other factors constant.

For the market to rationally put a price on these quality characteristics, they need to be measured in advance and predict future quality characteristics, that is, they need to be persistent. We show that this is indeed the case; profitable, growing, safe, and high-payout stocks continue on average to display these characteristics over the following five or ten years.

We test the pricing of quality over a long sample of U.S. stocks from 1956 to 2012 and a broad sample of stocks from 24 developed markets from 1986 to 2012. To evaluate the pricing of quality, we first run cross-sectional regressions of price-to-book on each stock's overall quality score. Both in the long and broad sample, we find that higher quality is significantly associated with higher prices. However, the explanatory power of quality on price is limited as the average R^2 is only 12% in the long sample and 6% in the broad sample. When we also control for the firm's size and past 12-month stock returns, the cross-sectional R^2 increases to, respectively, 31% and 26%, still leaving unexplained a large amount of the cross sectional distribution of prices. Interestingly, larger firms are more expensive controlling for quality, the analogue of the size effect on returns (Banz (1981)).

We also regress the price-to-book on the four quality measures separately and in a joint regression. Having all four quality measures separately modestly increases the R^2. Further, while profitability and growth are unambiguously associated with higher prices, safety is mixed and even negative controlling for size and past returns, and stocks with high payout appear to command a lower, not a higher, price.

There could be several potential reasons for the limited explanatory power of quality on prices: (a) market prices fail to fully reflect these characteristics for reasons linked to behavioral finance or constraints (e.g., an inability to lever), (b) market prices are based on superior quality characteristics than the ones we consider, and (c) the quality characteristics are correlated to risk factors not captured in our risk adjustments (so while the quality measure alone might command a higher P/B, the risk increase we fail to capture could imply an offsetting lower one).

To examine these potential explanations, we first consider the returns of high- vs. low-quality stocks. We sort stocks into ten deciles based on their quality score and consider the value-weighted return in each portfolio. We find that high-quality stocks have significantly higher raw returns than junk stocks. The difference in their risk-adjusted returns (i.e., 4-factor alphas) is even larger since high-quality stocks have relatively lower market, size, value and momentum exposures than junk stocks.

We then construct a QMJ factor with a methodology that follows that of Fama and French (1993) and Asness and Frazzini (2013). The factor is long the top 30% high-quality stocks and short the bottom 30% junk stocks within the universe of large stocks and similarly within the universe of small stocks.[3] This QMJ factor (as well as its large-cap only and small-cap only components) delivers positive returns in 23 out of 24 countries that we study and highly significant risk-adjusted returns in our long and broad sample. QMJ portfolios have negative market, value, and size exposures, positive alpha, relatively small residual risk and QMJ returns are high during market downturns, presenting a challenge to risk-based explanations relying on covariance with market crises. Rather than exhibiting crash risk, if anything QMJ exhibits a mild positive convexity, that is, it benefits from *flight to quality* during crises.

[3] As noted by Fama and French (2013) we can chose to orthogonalize each factor (size, value, momentum, quality) to each other in a potential nightmare of choices and dimensionality, or to to construct our factors more simply allowing some correlation among them. We choose the latter.

It is interesting to consider how the pricing of quality varies over time: Each month, we cross-sectionally regress price-to-book on quality and consider the time series of these cross-sectional regression coefficients that reflect the pricing of quality at each time. Consistent with conventional wisdom, the price of quality reached its lowest level in February 2000 during the height of the internet bubble. The price of quality was also relatively low leading into the 1987 crash and leading into the Global Financial Crisis of 2007-2009. Following each of these three eye-opening events, the price of quality increased, reaching highs in late 1990 (first gulf war), in late 2002 (after the Enron and WorldCom scandals), and in early 2009 (during the height of the banking crisis). Prices and returns are naturally connected, and we show that the price of quality negatively predicts the future return on QMJ; that is, a higher price of quality is naturally associated with a lower return on buying high-quality stocks.

We note that the QMJ strategy of buying profitable, safe, growing, high payout stocks while shorting unprofitable, risky, shrinking, low-yielding stocks is very different from the standard value strategy HML (in fact the two are negatively correlated). QMJ is buying and selling based on quality characteristics *irrespective* of stock prices, while HML is buying based on stock prices *irrespective* of quality. Naturally, the two concepts can be combined, which we call quality at a reasonable price (QARP). This concept goes back at least to Graham and Dodd (1934) who stated that "*investment must always the price as well as the quality of the security*." Naturally, value investing is improved by QARP, consistent with the finding in the accounting literature that accounting information can improve value investing (e.g., Frankel and Lee (1998) and Piotroski (2000)).

Last, we show what happens when we switch things around and put QMJ on the right-hand-side to help explain other factors. We find that controlling for quality makes the value effect stronger, just like QARP is stronger than HML alone. This makes sense as quality is positively associated with future returns, and negatively correlated with value.

Further, controlling for quality has a surprisingly significant effect on the size factor. We show that including quality on the right-hand-side resurrects the formerly moribund size effect. Indeed, the small-minus-big (SMB) factor is highly negatively correlated to the strong quality factor since small firms are junky and large firms are high quality, on average. While SMB has an insignificant alpha of 13 basis points per month controlling for the other standard factors, this increases to a highly significant alpha of 64 basis points (*t*-statistic of 6.39). In other words, when comparing stocks of similar quality, smaller stocks significantly outperform larger ones on average, which corresponds to our finding in price space that larger firms are more expensive.

Our paper is related to a large literature. A number of papers study return-based anomalies. It has been documented that stocks with high profitability outperform (Novy-Marx (2013)), stocks that repurchase tend to do well (Baker and Wurgler (2002), Pontiff and Woodgate (2008), McLean, Pontiff, and Watanabe (2009)), low beta is associated with high alpha for stocks, bonds, credit, and futures (Black, Jensen, and Scholes (1972), Frazzini and Pedersen (2013)), firms with low leverage have high alpha (George and Hwang (2010), Penman, Richardson, and Tuna (2007)), firms with high credit risk tend to under-perform (Altman (1968), Ohlson (1980), Campbell, Hilscher, and Szilagyi (2008)), growing firms outperform firms with poor growth (Mohanram (2005)), and firms with high accruals are more likely to suffer subsequent earnings disappointments and their stocks tend to underperform peers with low accruals (Sloan (1996), and Richardson, Sloan, Soliman, and Tuna (2005)). While these papers are very different and appear disconnected, our framework illustrates a unifying theme, namely that all these effects are about the outperformance of high-quality stocks, and we link returns and prices.

Our paper is also related to the literature that considers how the price-to-book predicts future returns and future fundamentals based on the present-value relationship. Campbell and Shiller (1988) consider the overall market, and their dividend growth variable can be interpreted an as aggregate quality variable. Vuolteenaho (2002) and Fama and French (2006) consider individual stocks. Cohen, Polk, and Vuolteenaho (2009) consider how cash-flow betas affect price levels and long-run returns, but they do not consider the pricing of other quality measures. See also the overview by Cochrane (2011) and references therein.

In summary, most of the characteristics that we study are well-known accounting variables, but we complement the literature by studying (i) how quality affect price multiples and how much of the cross-sectional variation of price multiples can be explained by quality; (ii) how the price of quality varies over time; (iii) how the current price of quality predicts the future return on quality factors; (iv) how our quality framework unifies a number of anomalies; and (v) how a unified quality factor can be used in asset pricing more broadly and, importantly, how it resurrects the size effect.

Our evidence presents a puzzle: why is the price of quality (the amount investors are willing to pay for higher quality characteristics) positive but still quite low and why, presumably a related or even the same question, is the return to QMJ so high? Our results are consistent with a too low market price of quality and inconsistent with an alternative view that the market prices simply reflect better measures of quality due to the high returns of QMJ. Furthermore, our QMJ factor has a negative market beta and factor loadings and performs well in recessions and crises, presenting a challenge to risk-based explanations, although that possibility, as always, remains open.

The rest of the paper is organized as follows. Section 1 presents our data and quality measures. Section 2 shows that ex ante quality forecasts future quality (i.e., quality is sticky as would be necessary for it to be priced). Section 3 analyzes the price of quality. Section 4 considers the return of quality stocks and Section 5 the return of QMJ. Section 6 connects the current price and future return of quality. Section 7 considers QARP. Section 8 shows how QMJ affects the standard factors. Section 9 concludes. The appendix contains a number of additional results and robustness checks.

1. Data, Methodology, and Quality Measures

In this section we describe our data sources and the methodology for constructing our quality measures.

Data Sources

Our sample consists of 39,308 stocks covering 24 countries between June 1951 and December 2012. The 24 markets in our sample correspond to the countries belonging to the MSCI World Developed Index as of December 31, 2012. We report summary statistics in Table I. Stock returns and accounting data are from the union of the CRSP tape and the

XpressFeed Global database. All returns are in USD, do not include any currency hedging, and are measured as excess returns above the U.S. Treasury bill rate.[4] We follow the standard convention and align accounting variables at the end of the firm's fiscal year ending anywhere in calendar year *t*-1 to June of calendar year *t*.

We focus on a *long sample* of U.S. stocks and a *broad sample* of global stocks. Our long sample of U.S. data includes all available common stocks on the merged CRSP/XpressFeed data.[5] The CRSP/XpressFeed database's first available date for U.S. securities is June 1951 since accounting data starts in fiscal year 1950. However, since some of our variables are five-year growth measures, the first available date for our regressions and return test is June 1956.

Our *broad sample* of global data includes all available common stocks on the union of the CRSP tape and the XpressFeed Global database for 24 developed markets.[6] We assign individual issues to the corresponding market based on the location of the primary exchange. For companies traded in multiple markets we use the primary trading vehicle identified by XpressFeed. As shown in Table I, with the exception of Canada (whose coverage starts in 1982) for most countries XpressFeed's Global coverage starts in 1986. Our sample runs from January 1986 to December 2012.

Quality Score

We use a variety of quality measures. We are interested in identifying stocks of profitable, stable, safe and high payout companies. To avoid data mining, we use a broad set of measures for each aspect of quality and average them to compute four composite proxies: *Profitability*, *Growth*, *Safety* and *Payout*. We then average the four proxies to compute a single quality score. Our results are qualitatively robust to the specific choices of factors.

[4] We include delisting returns when available in CRSP. Delisting returns are not available for our international sample. If a firm is delisted but the delisting return is missing, we investigate the reason for disappearance. If the delisting is performance-related, we follow Shumway (1997) and assume a -30% delisting return.

[5] Common stocks are identified by a CRSP share code (SHRCD) of 10 or 11.

[6] Common stocks are identified by an XpressFeed issue code (TPCI) of 0.

Having multiple measures of quality makes our finding of a low explanatory power of quality on prices all the more surprising.

Our quality measures are constructed as follows (details are in the appendix). We measure profitability by gross profits over assets (GPOA), return on equity (ROE), return on assets (ROA), cash flow over assets (CFOA), gross margin (GMAR), and the fraction of earnings composed of cash (i.e. low accruals, ACC). In order to put each measure on equal footing and combine them, each month we convert each variable into ranks and standardize to obtain a *z*-score. More formally, let x be the variable of interest and r be the vector of ranks, $r_i = rank(x_i)$. Then the *z*-score of x is given by $z(x) = z_x = (r - \mu_r)/\sigma_r$, where μ_r and σ_r are the cross sectional mean and standard deviation of r. Our $Profitabiliy$ score is the average of the individual *z*-scores:

$$Profitability = z\left(z_{gpoa} + z_{roe} + z_{roa} + z_{cfoa} + z_{gmar} + z_{acc}\right) \tag{2}$$

Similarly, we measure growth as the five-year prior growth in profitability, averaged across over measures of profitability:

$$Growth = z\left(z_{\Delta gpoa} + z_{\Delta roe} + z_{\Delta roa} + z_{\Delta cfoa} + z_{\Delta gmar} + z_{\Delta acc}\right) \tag{3}$$

Here, Δ denotes five-year growth. Specifically, for each profitability measure, we definite five-year growth as the change in the numerator (e.g. profits) divided by the lagged denominator (e.g. assets). We define safe securities as companies with low beta (BAB), low idiosyncratic volatility (IVOL), low leverage (LEV) , low bankruptcy risk (O-Score and Z-Score) and low ROE volatility (EVOL):

$$Safety = z(z_{bab} + z_{ivol} + z_{lev} + z_{o} + z_{z} + z_{evol}) \tag{4}$$

We define our payout score using equity and debt net issuance (EISS, DISS) and total net payout over profits (NPOP):

$$Payout = z\left(z_{eiss} + z_{diss} + z_{npop}\right) \tag{5}$$

Finally, we combine the four measures into a single quality score:

$$Quality = z(Profitabiliy + Growth + Safety + Payout) \tag{6}$$

Portfolios

Our portfolio analysis relies on two sets of test factors: quality-sorted portfolios and quality-minus-junk factors (hereafter, QMJ factors). For both approaches, we form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization.

To form quality-sorted portfolios, at the end of each calendar month, we assign stocks in each country to ten quality-sorted portfolios. U.S. sorts are based on NYSE breakpoints. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights.

The QMJ portfolio construction follows Fama and French (1992, 1993 and 1996) and Asness and Frazzini (2013). QMJ factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, we assign stocks to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country (which in the U.S. corresponds approximately to NYSE breakpoints). We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high-quality portfolios minus the average return on the two low-quality (junk) portfolios:

$$\begin{aligned} QMJ &= \frac{1}{2}(Small\ Quality + Big\ Quality) - \frac{1}{2}(Small\ Junk + Big\ Junk) \\ &= \underbrace{\frac{1}{2}(Small\ Quality - Small\ Junk)}_{QMJ \text{ in small stocks}} + \underbrace{\frac{1}{2}(Big\ Quality - Big\ Junk)}_{QMJ \text{ in big stocks}} \end{aligned} \tag{7}$$

Separate sub-portfolios based on the four components of quality (profitability, growth, safety and payout score) are constructed in a similar manner. We consider alphas with respect to a domestic and global factors for the market (MKT), size (small-minus-big, SMB), book-to-market (high-minus-low, HML), and momentum (up-minus-down, UMD).[7]

2. Ex Ante Quality Forecasts Fundamentals

We start by showing that a stock's quality is a persistent characteristic. That is, by picking stocks that were profitable, growing, safe, and well managed in the recent past, we succeed in picking stocks that display these characteristics in the future. This step is important when we turn to the central analysis of whether the high quality firms command higher prices since, in a forward-looking rational market, prices should be related to *future* quality characteristics. Of course, predictability of quality is perfectly consistent with an efficient market – market efficiency says only that, since prices should reflect quality, *stock returns* should be unpredictable (or only predictable due to risk premia) not that quality itself should be unpredictable.

Table II analyzes the predictability of quality as follows. Each month, we sort stocks into ten portfolios by their quality scores (as defined in Section 1). The table then reports the value-weighted average of our quality measures across stocks in the portfolio at the time of the portfolio formation (time t) and in the subsequent ten years (t + 120 months). We report the time series average of the value-weighted cross sectional means. The standard errors are adjusted for heteroskedasticity and autocorrelation with a lag length of five years (Newey and West (1987)). Table II shows that, on average, quality firms today remain high quality firms five and ten years into the future (conditional on survival) and we can reject the null hypothesis of no difference in each of quality characteristics up to ten years. Table A1 in the appendix reports additional results: we sort firms separately using each component of our quality score (profitability, growth, safety and payout) and report the spread in each variable up to 10 years, yielding similarly consistent results.

[7] The risk factors follow Fama and French (1992, 1993, 1996) and Asness and Frazzini (2013). We report a detailed description of their construction in the Appendix. The data can be downloaded at http://www.econ.yale.edu/~af227/data_library.htm.

To summarize, quality is a persistent characteristic such that high quality today predicts future high quality. For both the U.S. long and global sample, profitability is the most persistent and, while still surprisingly stable, growth and payout are the least persistent.

3. The Price of Quality

Given that quality can be measured in advance, we now turn to the central question of how quality is priced: Do high-quality stocks trade at higher prices than low-quality ones?

To address this question, we run a cross-sectional regression of the *z*-score of each stock *i*'s market-to-book (MB) ratio on its overall quality score, $Quality_t^i$ (defined in Section 1). Specifically, we let $P_t^i \equiv z(MB)_t^i$ and run the regression:

$$P_t^i = a + b\,Quality_t^i + \varepsilon_t^i \tag{8}$$

This regression tests whether high quality is associated with high prices in the cross section. Using *z*-scores limits the effect of outliers and it implies that the regression coefficient *b* has a simple interpretation: if quality improves by one standard deviation, then the price-to-book increases by *b* standard deviations.[8]

Panel A of Table III reports results of Fama and MacBeth (1973) regressions of prices on quality. Every month, we regress scaled prices on quality measures and we report time series averages of the cross sectional slope estimates. Standard errors are adjusted for heteroskedasticity and autocorrelation (Newey and West (1987)) with a lag length of 12 months. We run the regression with and without country-industry fixed effects. These fixed effects are implemented by varying the standardization universe of our *z*-scores. That is, to implement country-industry fixed effects, we convert each variable into ranks by country-industry and standardize to obtain a *z*-score by country-industry pair, each month. In this case, *b* has the interpretation that, if quality improves by one standard deviation above its

[8] Using (log) market-to-book on the left hand side as opposed to z-scores does not impact any of the results qualitatively. For brevity we only report results based on *z*-scores.

country-industry mean, then the price-to-book increases by *b* standard deviations above its country-industry mean.

Columns (1)-(8) in Table III panel A show that the price of quality *b* is generally positive: high quality firms command higher (scaled) prices. Indeed, the price of quality is positive both in the U.S. and global samples and across specifications with controls and fixed effects. The highest estimated price of quality is 0.32, in the univariate specification, and it is highly statistically significant. This coefficients means that a one standard deviation change in a stock's quality score is associated (in the cross section) with a 0.32 standard deviation change in its price-to-book score.

While theory does not provide specific guidance on what the R^2 "should" be, the explanatory power of quality on price appears limited. Quality explains only 12% of the cross sectional variation in prices in our U.S. sample and only 6% in our global sample.

We also include controls for firm size and stock return over the prior year. We measure each of these controls as the *z*-score of their cross-sectional rank for consistency and ease of interpretation of the coefficients. We see that larger firms are more expensive controlling for quality. This result is the analogue of the size effect on returns (Banz (1981), see also Berk (1995)) expressed in terms of prices. That is, big firms, even for the same quality, are more expensive, possibly leading to the return effect observed by Banz. The size effect could arise as large firms have less liquidity risk than small firms (Acharya and Pedersen (2005)) and thus we cannot dismiss that these higher prices are rational.

Past returns have a positive effect on current prices. We include past returns to account for the fact that prices and book values are not measured at the same time. Hence, the positive coefficients on the past returns simply reflect that high recent returns will raise prices while the book value has not had time to adjust.[9] We see that the R^2 increases markedly with these controls, but both the magnitude and the significance of the coefficient on quality actually drops with the inclusion of controls. The maximum R^2 is below 31% in all

[9] See Asness and Frazzini (2013).

of these specifications, leaving the vast majority of cross sectional variation on prices unexplained. .

Panel B of Table III considers cross-sectional regressions on each separate quality score, univariately and multivariately:

$$P_t^i = a + b^1\, b\,Profitability_t^i + b^2\ Growth_t^i + b^3\ Safety_t^i + b^4\ Payout_t^i + \varepsilon_t^i \qquad (9)$$

We see that prices of profitability and growth are unambiguously positive, the price of safety is positive in a univariate regression but negative in the presence of other quality measures and controls, and the price of payout is consistently estimated to be negative.[10] It is natural that the market pays a price for profitability and growth. The surprisingly low price of safety is a price-based analogue to the flat security market line (Black, Jensen, and Scholes (1972) and Frazzini and Pedersen (2013)) and it is consistent with Black (1972) and Frazzini and Pedersen (2013) theory of leverage constraints. If investors are constrained from leveraging, risky assets command higher prices (and lower returns) while safe assets have lower prices (and higher returns). The negative price of payout could be driven by reverse causality: firms that have high (low) prices may opportunistically issue (repurchase) shares.

The average R^2 increases when we include all four quality components, reaching 40% in the U.S. and 31% in the global sample but still leaving a large part of the cross section of prices unexplained.

4. The Return of Quality Stocks

We turn from the pricing of quality to the closely related issue of the return of quality stocks. The return of quality stocks is important as it can help us further interpret our findings on the price of quality. We would like to shed light on our finding that quality explains prices only to a limited extent: is this finding because of (a) limited market efficiency; (b) the

[10] Regressing prices on safety alone and controlling for size and past returns also yields an (insignificant) negative price of safety.

market uses superior quality measures (and, if we observed these measures, they would be strongly related to prices) or in some cases reverse causality; or (c) quality is linked to risk in a way not captured by our safety measure. Explanation (a) implies that high-quality stocks have higher risk-adjusted returns than low-quality stocks as investors are underpricing high quality characteristics; (b) implies no relation between our measured quality and ex post returns or at least a greatly attenuated one; while (c) implies a univariate relation between quality and future returns which is reduced or eliminated by an effective risk model.

Table IV reports the returns of stocks sorted into ten deciles based on their quality score. The table reports both excess returns over T-bills and alphas with respect to, respectively, the CAPM 1-factor model, the Fama and French (1993) 3-factor model (which includes the size factor SMB and the value factor HML in addition to the market factor MKT), and the 4-factor model that also includes the momentum factor UMD (Jegadeesh and Titman (1993), Asness (1994), and Carhart (1997)). Specifically, these alphas are the intercepts from the following regression with the first 1, 3, or 4 right-hand-side variables included:

$$r_t = \alpha + \beta^{MKT} MKT_t + \beta^{SMB} SMB_t + \beta^{HML} HML_t + \beta^{UMD} UMD_t + \varepsilon_t \qquad (10)$$

We see that excess returns increase almost monotonically in quality such that high-quality stocks outperform low-quality stocks. The right-most column reports the return difference between the highest and lowest deciles and the associated *t*-statistic, showing that high quality stocks earn higher average returns than low quality stocks (between 47 and 68 basis points per month depending on the sample) and we can reject the null hypothesis of no difference in average returns (*t*-statistics ranging between 2.80 and 3.22).

When we control for market risk and other factor exposures, the outperformance in the alpha of high-quality stocks is in fact even larger. This higher outperformance arises because high-quality stocks actually have lower market and factor exposures than low-quality stocks. Adjusting by the CAPM alone materially strengthens our results as higher quality stocks are, partly by construction, lower beta stocks. Across our three risk models in our long U.S. sample, a portfolio that is long high quality stocks and short low quality stocks earns average abnormal returns ranging from 71 to 97 basis points per month with associated *t*-statistics ranging between 4.92 and 9.02. In our broad global sample, we obtain similar results with abnormal returns between 89 to 112 basis points and *t*-statistics between 5.00 and 6.06.

Our results are thus inconsistent with explanation (b) discussed above. Further, a simple risk explanation (c) is inconsistent with our finding that high-quality stocks have lower market exposures than junk stocks, but we study risk in more detail by considering the performance of the QMJ factor.

5. Quality Minus Junk

In this section we examine the returns of our QMJ factors. As described in Section 1 (Equation 7), QMJ is long the average of the *Small Quality* and *Big Quality* portfolios and short the average of the *Small Junk* and *Big Junk* portfolios. We also construct long/short factors based on each separate quality component using the same method. Hence, in addition to QMJ, we have quality factors based on profitability, safety, growth, and payout.

Table V reports the correlations between the different quality components. The table reports the correlation both for the excess returns and for the abnormal returns relative to a 4-factor model (i.e., the correlations of the regression residuals). We see that all of the pairwise correlations among the quality components are positive, except the correlation between growth and payout. The negative correlation reflects that higher payout is naturally associated with lower growth. The average pairwise correlation among the quality components is 0.40 in the US and 0.45 in the global sample, and 0.38 for abnormal returns in both samples. Hence, while the quality components measure different firm characteristics that investors should be willing to pay for, firms that are high quality in one respect tend to also be high quality in other respects. This did not have to be. Each of these variables, we argue, are quality measures investors should pay for at the margin, but they did not have to be related to one another. While theory is no guide here, we think these significant positive correlations lend support to our practical decision to combine these four thematic sets of measures as one quality variable.

Table VI reports the performance of each of our quality factors in the US (panel A) and globally (panel B). Specifically, the table reports the average excess returns and the alphas with respect to the 1-, 3-, and 4- factor models. We see that each quality factor delivers a statistically significant positive excess return and alpha with respect to the 1-, 3-, and 4-factor models in the U.S. sample and significant 4-factor alphas in the global sample as well (the 3- and 4-factor results are quite similar as momentum, or UMD, does not change much). Naturally, the overall QMJ factor is the strongest or the four, with highly significant alphas in the U.S. and global samples. The abnormal returns are large in magnitude and highly statistically significant. In our U.S. long sample a QMJ portfolio that is long high quality stocks and short junk stocks delivers 1-, 3-, and 4-factor abnormal returns of 55, 68, and 66 basis points per month (with corresponding *t*-statistics of 7.27, 11.10, and 11.20). Similarly, in our Global broad sample, the QMJ factor earns abnormal returns of 52, 61 and 45 basis points per month (with corresponding *t*-statistics of 5.75, 7.68, 5.50).

Panels A and B of Table VI also report the risk-factor loadings for the 4-factor model. We see that the QMJ factor has a significantly negative market and size exposures. That is, QMJ is long low-beta and large stocks, while being short high-beta small ones. As would be expected, the safety factor has the most negative market exposure, though only growth attains a zero or small positive market beta, the other quality composites also show negative beta. The value exposure of QMJ is negative in the U.S. Since we expect that high-quality stocks have high prices while the value factor HML is long cheap stocks, we would expect a negative HML loading. We see that the profitability, safety, and growth factors do have significantly negative HML loadings in the U.S. and global samples. The payout factor has a positive loading in the U.S. and global samples. As discussed above, this positive payout loading could be driven by cheap stocks endogenously choosing a low payout.

Panel C of Table VI and Figure 1 report the performance of the QMJ factor across countries. Remarkably, the QMJ factor delivers positive returns and alphas in all but one of the 24 countries that we study, displaying a strikingly consistent pattern (with the only small negative being in New Zealand, one of the smallest countries in market capitalization and number of stocks). Furthermore 4-factors alphas are statistically significant in 17 out of 24 countries which is striking given the fact that many individual countries have a small cross section of securities and a short time series.

Figures 2 and 3 show the performance of the QMJ factor over time in the U.S. and global samples. Specifically, Figure 2 shows the cumulative return of the QMJ factor (plotted as the cumulative sum of excess returns to avoid compounding issues) and Figure 3 shows the cumulative sum of QMJ's 4-factor risk-adjusted returns (the sum of the monthly in-sample regression alpha plus the regression error). Clearly, the QMJ factor has consistently delivered positive excess returns and risk-adjusted returns over time with no subsample driving our results.

We report a series of robustness checks in the appendix. In Table A3 we split the sample in 20-year subsamples and report QMJ returns by size (10 size-sorted based on NYSE-breakpoints). Table A4 and Figure A1 report results for large and small cap stocks within each country. Finally, Table A5 reports results for an alternative definition of the QMJ factor: we build a factor for each of the 22 quality measures we use and simply average the resulting portfolios returns to compute our profitability, growth, safety, payout and QMJ factors. All the results point in the same direction with consistency across size, time periods, countries and construction methodology: QMJ portfolios that are long high quality stocks and short junk stocks earn large and significant 1- , 3- and 4-factor abnormal returns.

The return evidence on the QMJ factors could potentially be consistent with both mispricing (quality stocks are underpriced and junk stocks are overpriced), or risk (quality stocks underperform junk stocks in bad states of the world). Although a full explanation of the driver of quality returns is beyond the scope of this paper, we can nonetheless provide some stylized facts that either explanation should generate in order to fit the available evidence.

The evidence does not point toward compensation for tail risk as seen in Table VII. We compute the return of the QMJ factors during recession and expansions, during severe bear and bull markets (defined as total market returns in the past 12 months below -25% or above +25%), during periods of high and low market volatility (we measure volatility as the 1-month standard deviation of daily returns of the CRSP-value weighted index or the MSCI-World index and split the sample in the 30% top and bottom time periods) and during periods of a large increase or drop in aggregate volatility (again, we split the sample into the 30% top and bottom time periods in terms of the 1-month change in volatility). We find no evidence of compensation for tail risk, if anything quality appears to hedge (as opposed being correlated to periods) of market distress.

To study further the risk of QMJ, Figure 4 plots the performance of QMJ against the return on the market. The negative beta of QMJ is clearly visible by the downward sloping relation of the excess return of QMJ and the market. Further, the relatively tight fit around the curve shows the limited residual risk, implying a strong and consistent historical performance of QMJ during down periods for the market. QMJ also performs well in extreme down markets; in fact, the second-order polynomial showed in the graph has a positive (but insignificant) quadratic term (meaning that the fitted curve bends upward in the extreme). This mild concavity is mostly driven by the returns to the profitability subcomponent of quality. In fact, the quadratic term is marginally significant (*t*-statistic of 2.0) for the profitability factor. The strong return in extreme down markets is consistent with a *flight to quality* (or at least profitability). That is, in down markets, investors may exhibit flight to quality in the sense that prices of unprofitable stocks drop more than the prices of profitable stocks, even adjusting for their betas. The strong performance of QMJ in down markets is robust to considering longer down periods for the market such as down quarters or down years (not shown). Further, looking at the alphas reveal a similar pattern of mild flight to quality.

Overall, our findings present a serious challenge for risk-based explanations (to the extent that bad states of the world are related to large negative realization of market returns) as high quality stocks appear to protect investors from severe market downturns. Of course, alternative risk-based explanations are always possible.

6. The Time Variation of the Price of Quality: Predicting QMJ

It is interesting to consider how the price of quality varies over time. To study this, Figure 5 shows the time series of the price of quality, that is, the time series of the Fama-MacBeth regression coefficients that we estimate above in Equation 8. We see that the price of quality varies significantly over time. As one might expect, the price of quality is lowest during the height of the internet bubble in early 2000 and has other large swings during time periods consistent with economics intuition as discussed in the introduction.

The intuitive pattern of the price of quality suggests that the variation is not just driven by noise. To explore further the variation in the price of quality, it is interesting to link prices and subsequent returns in the time series. Specifically, if this time variation is not due to mis-measurement noise, then a high price of quality should predict low subsequent returns of QMJ. Table VIII provides evidence of such predictability. This table reports the regression coefficients of time-series regressions of future QMJ returns on the ex ante price of quality:

$$QMJ_{t\to t+k} = \beta^{0} + \beta^{lagged\,FMB} b_{t-1} + \beta^{lagged\ QMJ} QMJ_{t-12,t-1} + \varepsilon_t \tag{11}$$

Said simply, $QMJ_{t\to t+k}$ is the return of QMJ over the future k months, b_{t-1} is the lagged price of quality (the variable of interest), and $QMJ_{t-12,t-1}$ controls for past returns. Let us describe each of these variables in detail.

We run the regression in two ways: Using the "raw" excess returns of the QMJ factor on the left hand side ("raw") and using the alpha of the QMJ factor on the left hand side ("alpha"). The future excess return on the raw QMJ factor is computed simply by cumulating returns, $QMJ_{t\to t+k} = \prod_{j=0}^{k}\left(1 + QMJ_{t+j} + r_{t+j}^{f}\right) - \prod_t \left(1 + r_{t+j}^{f}\right)$. To compute the alphas, we regress QMJ on the contemporaneous returns of the market, size, value, and momentum factors and compute the alpha as the regression residual plus the intercept (i.e., as the return of QMJ with its factor exposures hedged out). We then cumulate these alphas $QMJ_{t\to t+k} = \prod_{j=0}^{k}\left(1 + \alpha_{t+j} + r_{t+j}^{f}\right) - \prod_t \left(1 + r_{t+j}^{f}\right)$ and use them on the left hand side of (11). We consider alphas to ensure that the predictability of the price of quality on QMJ is not driven by any potential predictability of other factors.

The price of quality, b_{t-1} is the lagged Fama-MacBeth regression coefficient from Equation (8) that gives the connection between price and quality at each time. Specifically, the price of quality is estimated as column (1) in Table III for the U.S. and column (5) for the global sample. We are interested in testing the hypothesis that a high lagged price of quality predicts lower subsequent returns, that is, $b_{t-1} < 0$.

Last, $QMJ_{t-12,t-1}$ is defined as the portfolio–weighted average of the past 1-year returns of the stocks in the QMJ portfolio. This captures standard momentum effects, again to ensure that the predictability of the price of quality is a novel finding.

Table VIII reports only the regression coefficient for the variable of interest, b_{t-1}, the ex ante price of quality. We run overlapping forecasting regressions predicting returns from one month up to five years. We adjust standard errors for heteroskedasticity and autocorrelation induced by the overlapping returns (Newey and West (1987)) by setting the lag length equal to the forecasting horizon.

Table VIII shows that a high price of quality indeed predicts lower future returns on QMJ. In our U.S. long sample shown in Panel A, all the coefficients have the expected negative sign and we are able to reject the null hypothesis of no predictability in all but one specification. Predictability rises with the forecasting horizon, indicating slowly changing expected returns. The results for our shorter global sample in Panel B are noisier, but we see that all of the statistically significant coefficients are negative as expected. The bottom rows of Table VIII similarly test whether the price of the separate quality characteristics predict the returns of the corresponding long/short factors. While these results are noisier, the estimates tend to be negative and all of the statistically significant coefficients are again negative, as expected. We also run these tests using cross sectional coefficients obtained from a regression of the log book-to-market (as opposed to ranks) on the quality scores, thus preserving the scale of the spread in book to market ratios. Results are in general stronger for the U.S. sample and similar for our global sample. We report these results in Table A6 of the Appendix. To summarize, the results in Table VIII and Table A6 are consistent with the hypothesis that the variation of the price of quality is not pure noise but, rather, reflects changes in the market pricing of quality characteristics, generating variation in QMJ returns.

7. Quality at a Reasonable Price

It is interesting to consider what is the "fair" price of quality? That is, if we suppose that a stock's fundamental value V is a multiple of its quality, $V = m\,Quality$, then what is the fair value of *m*? Relatedly, if the market pays a price for quality different from *m*, then what is the best way to buy cheap quality stocks?

To answer these questions, we construct a long-short portfolio that we call *quality at a reasonable price* (QARP) as follows. Using the same factor construction as for QMJ, we construct a long-short portfolio based on the signal $n\,Quality_t^i - P_t^i$ for various choices of n. That is, QARP is based on the difference between a stock's quality times n minus its price-to-book score. We should get the highest alpha if we let $n = m$, that is, base the signal on the quality multiple that corresponds to the fundamental value (m is of course unobservable).

Indeed, in this case, the portfolio is long the highest-alpha securities and short the lowest-alpha securities.[11]

If the highest-quality stocks were the most expensive, then the quality and price ranks would line up, implying that $m = 1$. When we construct QARP empirically, we do find that the alpha is highest for *n* close to 1 both in the U.S. and globally.

Another way to consider QARP is to simply form a portfolio of quality (QMJ) and value (HML). The combination of QMJ and HML that has the highest Sharpe ratio puts a weight of about 70% on QMJ (and, hence, the remaining 30% on HML) in the U.S. and about 60% weight on QMJ globally.

The Sharpe ratio of QARP (whether constructed based on combining signals or combining factor returns) is naturally higher than either quality or value alone, about 0.7 in the U.S. and 0.9 globally. QARP performs well as quality strategies complement value by helping an investor avoid the "value trap," namely the trap of buying securities that look cheap but deserve to be cheap. Instead, QARP buys securities that are cheap relative to their quality. Our evidence suggests that the fair price of quality is above the level paid by the market.

8. QMJ on the Right-Hand-Side of a Factor Model

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[11] For simplicity consider a 2-period model so that the fundamental value is the expected payoff at time 2 discounted at the required return, $V = \frac{E(P_2)}{1+k}$, where *k* is the required return. The alpha of the security, that is, the expected excess return above the required return is then

$$\alpha = E\left(\frac{P_2}{P_1}\right) - 1 - k = \frac{V - P_1}{P_1}(1 + k)$$

Naturally, the alpha depends on the difference between the fundamental value V and the price P_1. Since our measures of quality and price are based on z-scores, we simply subtract the two (rather than dividing by price as above).

We have seen that QMJ is an intuitive and powerful factor that has significant alpha relative to the standard factors. It is also interesting to switch things around and put QMJ on the right-hand-side to see how it affects the alphas and interpretation of the standard factors. More broadly, QMJ is a useful factor to add to the toolbox of global factors, e.g., when researchers need to test whether new phenomena are driven by quality.

Table IX reports the results of regressing each of the SMB, HML, and UMD on the other standard factors, with and without QMJ on the right-hand-side. Let us first consider SMB, that is, the size effect. SMB has a modest, but significant, excess return in our US sample and an insignificant excess return in the global sample. In both samples, however, SMB actually has a small and insignificant alpha when controlling for the other standard factors (the market, HML, and UMD). The size effect could appear to be a fluke, an artifact of SMB's market exposure.[12]

Controlling for QMJ completely changes this conclusion. SMB has a very large negative exposure to QMJ. Clearly, small stocks are junky relative to big stocks. This finding is intuitive as small stocks could, for instance, be young firms that are yet to be profitable, safe, and high payout. Moreover, controlling for QMJ, the size effect becomes large and highly significant in both samples. The size effect is alive and well when we account for quality as small stocks outperform large stocks when we compare firms of similar quality (and market beta, value and momentum exposure). This finding in return space is the analog of the strong size effect for prices that we documented in Table III.

Table IX further shows that HML has a negative loading on QMJ. This is also intuitive as cheap stocks (with high book-to-market) are naturally lower quality than expensive stocks. This negative loading implies that controlling for QMJ increases the alpha of HML, strengthening the value effect.

Lastly, UMD has positive loading on QMJ, which is significant in the global but not U.S. sample. Controlling for this exposure to quality lowers the alpha of UMD, but the momentum effect remains highly significant in both samples. Quality has several other

[12] This alpha is further reduced if we include lagged versions of the market return on the right-hand-side to account for possible illiquidity in SMB, a complication we do not pursue in this paper.

interesting implications for the standard factors and asset pricing more broadly, which we intend to explore further in future research.

9. Conclusion

In this paper we define a quality security as one that has characteristics that should command a higher (scaled) price. Following from the Gordon Growth Model, quality stocks are safe, profitable, growing, and have high payout ratio. We create definitions of all four quality subcomponents, and quality in general, which are robust and inclusive from across the literature and test the hypothesis that high quality firms have higher scaled prices.

Consistent with market efficiency, we find that high quality firms do exhibit higher prices on average. However, the explanatory power of quality on prices is low, leaving the majority of cross sectional dispersion in scaled prices unexplained. As a result, high quality firms exhibit high risk-adjusted returns. A quality-minus-junk (QMJ) factor that goes long high-quality stocks and shorts low-quality stocks earns significant risk-adjusted returns with an information ratio above 1 (i.e., a Sharpe ratio above 1 after hedging its other factor exposures) in the U.S. and globally across 24 countries.

Our results present a puzzle for asset pricing. They are consistent with quality stocks being underpriced and junk stocks overpriced or, alternatively, with quality stocks being riskier than junk stocks. However, while one can never rule out a risk explanation for the high return of quality stocks, we are unable to identify this risk; in anything, we find evidence of the opposite. We show that quality stocks are low beta and, rather than exhibiting crash risk, if anything they benefit from “flight to quality,” that is, they have a tendency to perform well during periods of extreme market distress. These findings present a challenge for risk-based explanations where bad states of the world are negatively correlated to extreme return realizations of the market factor.

Finally, we show that the price of quality varies over time, generating a time-varying expected return on quality-minus-junk portfolios: a low price of quality predicts a high future return of quality stocks relative to junk stocks.

In summary, we document strong and consistent abnormal returns to quality, and do so in a far more inclusive and complete setting than prior papers using all four components implied by the Gordon Growth Model simultaneously. We also tie these results to the cross-section and time-series of the pricing of quality in novel ways.

Our results present an important puzzle for asset pricing: We cannot tie the returns of quality to risk, or, in a highly related finding, demonstrate that prices cross-sectionally vary “enough” with quality measures. At this point the returns to quality must be either an anomaly, data mining (incredibly robust data mining - including across countries, size and time periods, and encompassing the strong consistent U.S. and global correlations of quality to size), or the results of a still-to-be-identified risk factor not from the 4-factor model.

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Table I
Summary Statistics

This table shows summary statistics as of June of each year. The sample includes all U.S. common stocks (CRSP "shrcd" equal to 10 or 11) and all global stocks ("tcpi" equal to 0) in the merged CRSP/Xpressfeed global databases.

Country	Total number of stocks	Average number of stocks	Firm size (Billion-USD)	Weight in global portfolio	Start Year	End Year
Australia	2,142	660	0.63	0.018	1986	2012
Austria	126	56	0.70	0.002	1990	2012
Belgium	231	91	2.37	0.009	1990	2012
Canada	1,901	541	1.08	0.022	1982	2012
Switzerland	343	135	4.06	0.023	1986	2012
Germany	1,492	596	3.01	0.061	1989	2012
Denmark	227	85	1.08	0.004	1986	2012
Spain	212	82	4.48	0.014	1986	2012
Finland	202	83	1.66	0.005	1986	2012
France	1,088	397	2.85	0.044	1986	2012
United Kingdom	3,312	1,103	1.83	0.095	1986	2012
Greece	239	132	0.48	0.002	1995	2012
Hong Kong	1,351	516	1.21	0.026	1989	2012
Ireland	106	38	1.58	0.002	1987	2012
Israel	284	97	0.64	0.003	1995	2012
Italy	356	129	2.37	0.018	1986	2012
Japan	3,856	1,988	1.29	0.202	1986	2012
Netherlands	250	109	4.70	0.021	1986	2012
Norway	429	120	0.96	0.004	1986	2012
New Zealand	176	69	1.26	0.003	1990	2012
Portugal	92	38	1.96	0.002	1990	2012
Singapore	860	353	0.60	0.009	1990	2012
Sweden	677	203	1.35	0.012	1986	2012
United States	19,356	3,594	1.31	0.399	1951	2012

Table II
Persistence of Quality Measures

This table shows average quality scores. Each calendar month, stocks in each country in are ranked in ascending order on the basis of their quality score. The ranked stocks are assigned to one of ten portfolios. U.S. sorts are based on NYSE breakpoints. This table reports the value-weighted average of quality measures across stocks in the portfolio at portfolio formation (t) up to the subsequent ten years (t + 120 months). We report the time series average of the value-weighted cross sectional means. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Standard errors are adjusted for heteroskedasticity and autocorrelation with a lag length of five years (Newey and West (1987)) and 5% significance is indicated in bold.

Panel A: Long Sample		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10 - P1	P10 - P1
U.S., 1956 - 2012		(Low)									(High)		t-stat
Quality	t	-1.38	-0.71	-0.39	-0.15	0.05	0.25	0.46	0.69	1.00	1.56	**2.94**	47.46
Quality	t + 12M	-0.60	-0.29	-0.14	0.00	0.14	0.29	0.45	0.63	0.86	1.31	**1.92**	37.42
Quality	t + 36M	-0.33	-0.12	-0.05	0.05	0.15	0.27	0.40	0.54	0.74	1.16	**1.49**	33.01
Quality	t + 60M	-0.16	-0.02	0.04	0.09	0.16	0.22	0.35	0.46	0.68	1.04	**1.20**	20.68
Quality	t + 120M	-0.09	0.00	0.03	0.07	0.09	0.21	0.30	0.38	0.62	0.89	**0.98**	20.70
Profit	t + 120M	-0.37	-0.19	-0.10	0.05	0.12	0.18	0.29	0.35	0.59	1.08	**1.44**	20.74
Growth	t + 120M	-0.23	-0.19	-0.13	-0.12	-0.10	-0.12	-0.02	0.11	0.11	0.34	**0.57**	6.10
Safety	t + 120M	-0.28	-0.15	-0.03	0.08	0.15	0.21	0.35	0.49	0.63	0.67	**0.95**	9.68
Payout	t + 120M	0.12	0.29	0.28	0.29	0.38	0.39	0.49	0.49	0.56	0.61	**0.49**	17.31

Panel B: Broad Sample		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	H-L	H-L
Global, 1956 -		(Low)									(High)		t-stat
Quality	t	-1.45	-0.79	-0.45	-0.19	0.04	0.25	0.47	0.72	1.04	1.62	**3.07**	42.28
Quality	t + 12M	-0.59	-0.29	-0.14	0.01	0.13	0.27	0.44	0.60	0.85	1.28	**1.87**	39.05
Quality	t + 36M	-0.30	-0.13	-0.05	0.06	0.13	0.23	0.36	0.48	0.70	1.07	**1.37**	44.95
Quality	t + 60M	-0.10	0.00	0.04	0.10	0.13	0.20	0.32	0.42	0.61	0.93	**1.03**	35.22
Quality	t + 120M	-0.08	-0.01	0.07	0.07	0.10	0.19	0.27	0.36	0.52	0.75	**0.82**	35.47
Profit	t + 120M	-0.28	-0.08	0.00	0.10	0.14	0.23	0.34	0.37	0.53	0.90	**1.19**	22.77
Growth	t + 120M	-0.19	-0.16	-0.15	-0.14	-0.12	-0.09	-0.07	0.00	0.09	0.18	**0.37**	6.40
Safety	t + 120M	-0.22	-0.14	-0.09	0.02	0.06	0.11	0.20	0.32	0.50	0.52	**0.74**	13.59
Payout	t + 120M	0.17	0.28	0.35	0.31	0.42	0.42	0.49	0.48	0.51	0.57	**0.40**	8.15

Table III
Results: Cross Sectional Regressions, the Price of Quality

This table reports coefficients from Fama-Macbeth regressions. The dependent variable is the z-score of a stock's market to book ratio (MB) in month t. The explanatory variables are the quality scores in month t and a series of controls. *Size* is the z-score of the stock's market equity (ME). $Ret(t)$ is the stock return in month t. $Ret(t-12,t)$ is the stock return in the prior year. All variables are rescaled to have a zero mean and a standard deviation of one. When indicated ("Industry FE", "Country FE") variables are standardized by industry-country pairs. Average R2 is the time series averages of the adjusted R-square of the cross sectional regression. Standard errors are adjusted for heteroskedasticity and autocorrelation (Newey and West (1987)) with a lag length of 12 months. T-statistics are shown below the coefficient estimates and 5% statistical significance is indicated in bold.

Panel A: The Price of Quality

	Long Sample (U.S. , 1956 - 2012)				Broad Sample (Global, 1986 - 2012)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Quality	**0.32**	**0.19**	**0.32**	**0.20**	**0.24**	**0.10**	**0.22**	**0.09**
	(22.47)	(15.94)	(23.92)	(13.94)	(23.33)	(17.20)	(24.39)	(15.54)
Size		**0.31**		**0.30**		**0.29**		**0.31**
		(19.19)		(27.08)		(17.71)		(20.91)
Ret(t-12,t)		**0.27**		**0.28**		**0.27**		**0.28**
		(21.36)		(26.50)		(18.60)		(22.54)
Industry FE	No	No	Yes	Yes	No	No	Yes	Yes
Country FE					Yes	Yes	Yes	Yes
Average R2	0.12	0.31	0.11	0.30	0.06	0.25	0.05	0.26

Panel B: The Price of Each Quality Component

	Long Sample (U.S., 1956 - 2012)					Broad Sample (Global, 1986 - 2012)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Profitability	**0.41**	.	.	.	**0.30**	**0.29**	.	.	.	**0.19**
	(26.19)	.	.	.	(23.64)	(33.76)	.	.	.	(31.37)
Growth	.	**0.38**	.	.	**0.11**	.	**0.28**	.	.	**0.08**
	.	(31.18)	.	.	(12.25)	.	(35.02)	.	.	(12.67)
Safety	.	.	**0.14**	.	**-0.08**	.	.	**0.11**	.	**-0.10**
	.	.	(9.95)	.	-(11.38)	.	.	(8.19)	.	-(12.59)
Payout	.	.	.	**-0.10**	**-0.13**	.	.	.	**-0.06**	**-0.10**
	.	.	.	-(11.11)	-(18.41)	.	.	.	-(4.69)	-(11.23)
Size					**0.28**					**0.31**
					(26.22)					(21.67)
Ret(t-12,t)					**0.28**					**0.28**
					(28.69)					(23.33)
Industry FE	No	No	No	No	Yes	No	No	No	No	Yes
Country FE						Yes	Yes	Yes	Yes	Yes
Average R2	0.18	0.15	0.03	0.01	0.40	0.09	0.08	0.02	0.01	0.31

Table IV
Quality-Sorted Portfolios

This table shows calendar-time portfolio returns. Each calendar month, stocks in each country in are ranked in ascending order on the basis of their quality score. The ranked stocks are assigned to one of ten portfolios. U.S. sorts are based on NYSE breakpoints. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. The rightmost column reports returns of a self-financing portfolio that is long the high quality portfolio and shorts the low quality portfolio. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Beta is the realized loading on the market portfolio. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios are annualized.

Panel A: Long Sample U.S. , 1956 - 2012	P1 (Low)	P2	P3	P4	P5	P6	P7	P8	P9	P10 (High)	H-L
Excess return	0.15	0.36	0.38	**0.39**	**0.45**	**0.45**	**0.57**	**0.47**	**0.58**	**0.61**	**0.47**
	(0.55)	(1.56)	(1.90)	(2.04)	(2.51)	(2.60)	(3.42)	(2.75)	(3.48)	(3.68)	(2.80)
CAPM alpha	**-0.53**	**-0.24**	**-0.15**	**-0.12**	-0.02	-0.01	**0.13**	0.01	**0.14**	**0.18**	**0.71**
	(-4.62)	(-2.85)	(-2.25)	(-2.01)	(-0.33)	(-0.18)	(2.41)	(0.23)	(2.71)	(2.86)	(4.92)
3-factor alpha	**-0.67**	**-0.38**	**-0.25**	**-0.21**	-0.08	-0.06	**0.12**	0.01	**0.16**	**0.29**	**0.97**
	(-7.83)	(-5.47)	(-4.47)	(-4.11)	(-1.44)	(-1.09)	(2.26)	(0.12)	(3.37)	(5.24)	(9.02)
4-factor alpha	**-0.56**	**-0.42**	**-0.26**	**-0.29**	**-0.14**	**-0.12**	0.04	-0.05	**0.19**	**0.41**	**0.97**
	(-6.24)	(-5.73)	(-4.26)	(-5.39)	(-2.37)	(-2.22)	(0.68)	(-1.08)	(3.62)	(7.10)	(8.55)
Beta	1.28	1.22	1.08	1.09	1.03	1.01	0.97	1.00	0.95	0.90	-0.38
Sharpe Ratio	0.07	0.21	0.25	0.27	0.33	0.35	0.46	0.37	0.46	0.49	0.37
Information Ratio	-0.90	-0.82	-0.61	-0.77	-0.34	-0.32	0.10	-0.15	0.52	1.02	1.23
Adjusted R2	0.90	0.91	0.92	0.93	0.90	0.91	0.91	0.93	0.92	0.90	0.60

Panel B: Broad Sample Global , 1986 - 2012	P1 (Low)	P2	P3	P4	P5	P6	P7	P8	P9	P10 (High)	H-L
Excess return	-0.03	0.35	0.43	0.38	0.52	0.46	**0.57**	**0.52**	**0.61**	**0.65**	**0.68**
	(-0.08)	(1.01)	(1.42)	(1.25)	(1.85)	(1.74)	(2.29)	(2.08)	(2.54)	(2.78)	(3.22)
CAPM alpha	**-0.61**	-0.20	-0.06	-0.12	0.07	0.03	0.17	0.11	**0.22**	**0.28**	**0.89**
	(-3.20)	(-1.19)	(-0.42)	(-0.90)	(0.53)	(0.25)	(1.52)	(1.05)	(2.05)	(2.44)	(5.00)
3-factor alpha	**-0.73**	**-0.33**	-0.18	**-0.24**	-0.02	-0.04	0.10	0.11	**0.24**	**0.39**	**1.12**
	(-4.14)	(-2.08)	(-1.33)	(-1.98)	(-0.17)	(-0.35)	(0.92)	(0.98)	(2.17)	(3.49)	(7.68)
4-factor alpha	**-0.46**	-0.24	-0.09	-0.23	0.01	-0.04	0.10	0.11	**0.23**	**0.47**	**0.93**
	(-2.49)	(-1.44)	(-0.63)	(-1.75)	(0.06)	(-0.36)	(0.91)	(0.95)	(1.97)	(3.96)	(6.06)
Beta	1.14	1.12	1.00	1.03	0.94	0.91	0.85	0.87	0.82	0.78	-0.36
Sharpe Ratio	-0.01	0.20	0.27	0.24	0.36	0.33	0.44	0.40	0.49	0.53	0.62
Information Ratio	-0.53	-0.30	-0.13	-0.37	0.01	-0.08	0.19	0.20	0.41	0.84	1.28
Adjusted R2	0.79	0.80	0.81	0.84	0.81	0.82	0.82	0.82	0.80	0.79	0.56

Table V
Quality Minus Junk: Correlations

This table shows correlation of monthly returns. Quality minus Junk (QMJ) factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. Portfolios based on profitability, growth, safety and payout score are constructed in a similar manner. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Abnormal returns are constructed as the intercept plus the residual of a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios.

	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
	Returns					Returns				
QMJ	1.00					1.00				
Profitability	0.82	1.00				0.79	1.00			
Safety	0.88	0.64	1.00			0.86	0.84	1.00		
Growth	0.24	0.52	0.15	1.00		0.28	0.36	0.27	1.00	
Payout	0.69	0.35	0.53	-0.34	1.00	0.76	0.46	0.51	-0.19	1.00
	Abnormal Returns (4-factor)					Abnormal Returns (4-factor)				
QMJ	1.00					1.00				
Profitability	0.82	1.00				0.70	1.00			
Safety	0.72	0.43	1.00			0.71	0.76	1.00		
Growth	0.42	0.49	0.18	1.00		0.35	0.30	0.15	1.00	
Payout	0.62	0.44	0.30	-0.06	1.00	0.69	0.36	0.33	-0.09	1.00

Table VI
Quality Minus Junk: Returns

This table shows calendar-time portfolio returns and factor loadings. Quality minus Junk (QMJ) factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. Portfolios based on profitability, growth, safety and payout score are constructed in a similar manner. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios (i.e., the Sharpe ratio of the regression residual) are annualized.

	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

Table VI (Continued)
Quality Minus Junk: By Country

This table shows calendar-time portfolio returns and factor loadings. Quality minus Junk (QMJ) factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. Portfolios based on profitability, growth, safety and payout score are constructed in a similar manner. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our Long Sample of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our Broad Sample of global stocks. Panel C reports results by country. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios are annualized.

	Excess return	T-stat Excess return	4-factor Alpha	T-stat Alpha	Factor Loadings				Sharpe Ratio	Information Ratio	Number of months	Date Range
					MKT	SMB	HML	UMD				
Australia	0.34	1.51	**0.55**	2.73	-0.17	-0.40	0.10	0.00	0.36	0.75	210	1995-2012
Austria	0.21	0.66	0.38	1.42	-0.33	-0.04	-0.15	0.11	0.16	0.36	198	1996-2012
Belgium	0.43	1.59	0.36	1.57	-0.16	-0.09	-0.16	0.27	0.38	0.41	210	1995-2012
Canada	**0.61**	2.98	**0.39**	2.05	-0.19	-0.07	0.28	0.21	0.59	0.43	306	1987-2012
Switzerland	0.39	1.41	**0.64**	3.17	-0.35	-0.31	-0.33	0.08	0.34	0.79	210	1995-2012
Germany	**0.48**	2.35	**0.59**	3.56	-0.24	-0.11	-0.19	0.05	0.56	0.92	210	1995-2012
Denmark	**0.66**	2.08	0.49	1.90	-0.20	-0.25	-0.34	0.17	0.50	0.48	204	1996-2012
Spain	0.15	0.58	0.20	0.88	-0.25	-0.08	-0.06	0.18	0.14	0.22	210	1995-2012
Finland	0.53	1.40	0.59	1.93	-0.08	-0.17	-0.51	-0.01	0.34	0.48	210	1995-2012
France	0.45	1.86	**0.53**	2.96	-0.27	-0.04	-0.17	0.16	0.45	0.76	210	1995-2012
United Kingdom	0.17	0.69	0.32	1.35	-0.27	-0.16	-0.15	0.08	0.15	0.33	246	1992-2012
Greece	**1.35**	2.54	**1.06**	3.07	-0.07	-0.21	-0.19	0.34	0.79	0.98	126	2002-2012
Hong Kong	0.61	1.72	**1.02**	4.15	-0.27	-0.42	-0.18	0.08	0.41	1.04	210	1995-2012
Ireland	0.53	0.85	0.84	1.59	-0.53	0.04	-0.17	0.12	0.20	0.39	208	1995-2012
Israel	0.66	1.72	**0.85**	2.67	-0.33	-0.13	-0.12	0.07	0.51	0.85	138	2001-2012
Italy	**0.72**	2.54	**0.69**	3.60	-0.21	-0.12	-0.22	0.26	0.62	0.91	198	1996-2012
Japan	0.22	1.02	**0.38**	2.40	-0.31	-0.28	-0.15	0.10	0.23	0.59	246	1992-2012
Netherlands	0.10	0.33	0.34	1.43	-0.37	-0.08	-0.15	0.04	0.08	0.35	210	1995-2012
Norway	0.61	1.95	**0.68**	2.47	-0.19	-0.23	-0.13	0.18	0.47	0.61	210	1995-2012
New Zealand	0.07	0.22	-0.05	-0.17	-0.15	-0.06	-0.14	0.16	0.05	-0.04	210	1995-2012
Portugal	0.86	1.87	**0.89**	2.30	-0.26	-0.08	-0.26	0.18	0.53	0.67	150	2000-2012
Singapore	0.26	0.90	**0.44**	2.38	-0.22	-0.31	-0.11	0.06	0.22	0.60	210	1995-2012
Sweden	0.40	1.49	**0.50**	2.36	-0.22	-0.26	-0.22	0.15	0.32	0.53	256	1991-2012
United States	**0.40**	4.38	**0.66**	10.20	-0.25	-0.38	-0.12	0.02	0.58	1.46	678	1956-2012
Global	**0.38**	3.22	**0.45**	5.50	-0.24	-0.33	-0.01	0.15	0.62	1.16	324	1986-2012

Table VII
QMJ: Recessions, Severe Bear and Bull Markets and Volatility Environment

This table shows calendar-time portfolio returns of QMJ factors in different macroeconomic environments. Quality minus Junk (QMJ) factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. Portfolios based on profitability, growth, safety and payout score are constructed in a similar manner. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our Long Sample of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our Broad Sample of global stocks. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios are annualized. "Recession" indicates NBER recessions. "Expansion" indicates all other months. "Severe bear (bull) market" is defined as a total market return in the past 12-month below (above) -25% (25%). "Low (high) volatility" indicated periods of low (high) market volatility. We measure volatility as the 1-month standard deviation of daily returns of the CRSP-value weighted index or the MSCI-World index and split the sample in the top and bottom 30% high and low periods. "Spike Up (down) in Volatility" indicate periods of large increases or drops in market volatility. We measure volatility changes as the 1-month change in market volatility and split the sample into the top and bottom 30% high and low periods.

Panel A: Long Sample	Return				t-statistics				
U.S., 1956 - 2012	Excess Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha	Excess Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha	Number of months
All Periods	**0.40**	**0.55**	**0.68**	**0.66**	4.38	7.27	11.10	10.20	678
Recession	**0.76**	**0.73**	**0.96**	**0.95**	2.77	3.55	5.76	5.61	110
Expansion	**0.33**	**0.52**	**0.63**	**0.60**	3.48	6.30	9.81	8.63	568
Severe Bear market	0.07	0.39	0.76	0.87	0.07	0.57	1.52	1.65	21
Severe Bull Market	**0.42**	**0.42**	**0.56**	**0.68**	2.39	2.67	4.49	5.07	135
Low Volatility	**0.52**	**0.78**	**0.88**	**0.83**	2.37	4.64	6.42	5.93	227
High Volatility	**0.25**	**0.43**	**0.60**	**0.73**	2.24	4.20	7.64	8.60	227
Spike Up in Volatility	**0.49**	**0.57**	**0.65**	**0.67**	2.68	3.97	5.48	5.39	226
Spike Down in Volatility	0.30	**0.60**	**0.87**	**0.73**	1.90	4.42	8.36	6.62	226

Broad Sample	Return				t-statistics				
Global, 1986 - 2012	Excess Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha	Excess Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha	Number of months
All Periods	**0.38**	**0.52**	**0.61**	**0.45**	3.22	5.75	7.68	5.50	324
Recession	0.84	**0.46**	**0.89**	**0.92**	1.70	1.60	3.84	4.51	37
Expansion	**0.32**	**0.51**	**0.59**	**0.41**	2.74	5.36	7.01	4.67	287
Severe Bear market	0.15	**0.32**	**0.52**	**0.59**	0.13	0.89	2.30	2.18	15
Severe Bull Market	**0.71**	**0.73**	**0.59**	**0.61**	2.95	3.13	3.17	3.15	55
Low Volatility	**0.62**	**0.69**	**0.75**	**0.61**	2.73	4.65	5.61	4.87	144
High Volatility	0.07	**0.26**	**0.36**	**0.45**	0.45	1.89	2.85	2.95	75
Spike Up in Volatility	0.34	**0.48**	**0.45**	**0.35**	1.52	2.97	3.15	2.48	114
Spike Down in Volatility	**0.40**	**0.56**	**0.77**	**0.52**	2.12	3.65	5.74	3.91	120

Table VIII
Time Variation of the Price of Quality: High Price of Quality Predicts Low QMJ Returns

This table shows the time series regression of future quality factor returns on the lagged price of quality. The left hand side is the cumulative excess return of the QMJ factor (or profitability, growth, safety and payout factor) over the future 1, 12, 36, or 60 months. Each regression is run in two ways: Using the "raw" quality factor returns on the left hand side ("raw") or using the quality factor with its exposures to the market, size (SMB), book-to-market (HML), and momentum (UMD) hedged out (denoted "alpha"). The right hand side variables are the lagged price of quality and past quality returns. The lagged price of quality is the cross-sectional regression coefficient of market to book score on quality (Table III, Panel A column (1) and (5) and Panel B columns (1)-(4) and (6)-(9)). The past quality return is defined as the portfolio–weighted average of the past 1-year returns of the stocks in the quality portfolio. Panel A reports results from our Long Sample of U.S. stocks from June 1956 to December 2012. Panel B reports results from our Broad Sample of global stocks from June 1986 to December 2012. We report only the coefficient on the variable of interest, the lagged price of quality. T-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Standard errors are adjusted for heteroskedasticity and autocorrelation (Newey and West (1987)) with lag length equal to the forecasting horizon. "Mean Adj R2" is the average adjusted R-squared across all the regression above. The intercept and prior returns are included in all regressions but not reported.

	Panel A: Long Sample (U.S. , 1956 - 2012)								Panel B: Broad Sample (Global, 1986 - 2012)							
Left-hand side	Return (t)		Return (t, t+12)		Return (t, t+36)		Return (t, t+60)		Return (t)		Return (t, t+12)		Return (t, t+36)		Return (t, t+60)	
	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha
QMJ	**-0.02**	**-0.01**	**-0.27**	-0.17	**-0.67**	**-0.52**	**-1.01**	**-1.32**	-0.02	0.00	**-0.41**	0.05	**-0.69**	0.14	**-1.06**	**-2.14**
	(-2.70)	(-2.06)	(-2.50)	(-1.73)	(-2.61)	(-2.08)	(-2.27)	(-2.77)	(-1.02)	(0.40)	(-2.31)	(0.34)	(-2.04)	(0.35)	(-2.40)	(-4.33)
Profitability	**-0.02**	**-0.01**	**-0.20**	**-0.16**	**-0.58**	**-0.49**	**-0.86**	**-1.01**	0.00	0.01	-0.17	0.07	-0.41	0.02	-1.36	**-1.63**
	(-3.06)	(-2.87)	(-3.03)	(-2.30)	(-3.54)	(-2.79)	(-2.91)	(-3.58)	(0.21)	(0.95)	(-0.86)	(0.41)	(-0.73)	(0.04)	(-1.64)	(-2.17)
Growth	-0.01	0.00	-0.07	0.00	-0.12	0.18	0.49	-0.20	**-0.05**	**-0.04**	**-0.55**	**-0.53**	-0.94	**-1.21**	**-1.92**	-0.61
	(-0.92)	(0.23)	(-0.79)	(-0.02)	(-0.37)	(0.68)	(0.95)	(-0.37)	(-2.09)	(-2.07)	(-2.66)	(-2.62)	(-1.37)	(-2.81)	(-3.16)	(-0.81)
Safety	**-0.03**	0.00	**-0.37**	-0.11	**-1.10**	-0.67	-1.30	**-1.84**	-0.03	0.01	**-0.38**	0.07	**-0.65**	0.27	0.28	-0.53
	(-2.62)	(-0.35)	(-3.27)	(-1.29)	(-3.85)	(-1.46)	(-1.38)	(-3.11)	(-1.41)	(0.67)	(-2.44)	(1.14)	(-2.76)	(1.76)	(0.75)	(-1.55)
Payout	**-0.03**	-0.02	**-0.30**	-0.06	-0.66	-0.28	-0.91	**-1.58**	**-0.05**	-0.01	-0.37	0.02	-0.19	0.14	-0.77	**-1.02**
	(-2.04)	(-1.54)	(-2.06)	(-0.64)	(-1.53)	(-1.26)	(-1.91)	(-2.29)	(-2.08)	(-0.87)	(-1.59)	(0.21)	(-0.34)	(0.31)	(-1.68)	(-2.36)
Mean Adj R2	0.01	0.00	0.08	0.07	0.19	0.15	0.17	0.22	0.01	0.00	0.10	0.05	0.22	0.12	0.25	0.25

Table IX
Pricing HML, SMB and UMD

This table shows calendar-time portfolio returns and factor loadings. Quality minus Junk (QMJ) factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. Portfolios based on profitability, growth, safety and payout score are constructed in a similar manner. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The other variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. We run a regression of the SMB, HML and UMD factors of the remaining ones excluding and including the QMJ factor. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios are annualized.

	Panel A: Long Sample (U.S. , 1956 - 2012)						Panel B: Broad Sample (Global , 1986 - 2012)					
Left-hand side	SMB	SMB	HML	HML	UMD	UMD	SMB	SMB	HML	HML	UMD	UMD
Excess Returns	**0.28**	**0.28**	**0.34**	**0.34**	**0.70**	**0.70**	0.11	0.11	**0.45**	**0.45**	**0.58**	**0.58**
	(2.54)	(2.54)	(2.66)	(2.66)	(4.52)	(4.52)	(0.92)	(0.92)	(2.77)	(2.77)	(2.69)	(2.69)
Alpha	0.13	**0.64**	**0.77**	**0.94**	**1.05**	**1.01**	0.08	**0.36**	**0.79**	**0.81**	**1.07**	**0.72**
	(1.16)	(6.39)	(8.01)	(9.35)	(9.11)	(8.05)	(0.62)	(3.02)	(6.62)	(6.39)	(6.90)	(4.44)
MKT	**0.19**	**-0.08**	**-0.16**	**-0.23**	**-0.20**	**-0.18**	**0.06**	**-0.12**	**-0.09**	**-0.09**	**-0.20**	-0.04
	(7.38)	(-3.06)	(-7.04)	(-8.74)	(-7.39)	(-5.61)	(2.09)	(-3.90)	(-3.27)	(-2.73)	(-6.04)	(-0.94)
SMB			**0.08**	-0.03	0.04	0.07			-0.01	-0.02	0.02	**0.21**
	.		(2.34)	(-0.86)	(1.05)	(1.33)			(-0.24)	(-0.36)	(0.34)	(2.80)
HML	**0.10**	-0.03			**-0.81**	**-0.80**	-0.01	-0.02			**-0.89**	**-0.81**
	(2.34)	(-0.86)			(-23.24)	(-22.10)	(-0.24)	(-0.36)			(-16.81)	(-15.23)
UMD	0.04	0.04	**-0.55**	**-0.53**			0.02	**0.11**	**-0.53**	**-0.52**		
	(1.05)	(1.33)	(-23.24)	(-22.10)			(0.34)	(2.80)	(-16.81)	(-15.23)		
QMJ		**-0.83**		**-0.29**		0.06		**-0.67**		-0.03		**0.58**
		(-17.50)		(-5.03)		(0.82)		(-9.46)		(-0.31)		(5.54)
Sharpe Ratio	0.34	0.34	0.35	0.35	0.60	0.60	0.18	0.18	0.53	0.53	0.52	0.52
Information Ratio	0.17	0.96	1.10	1.36	1.23	1.18	0.13	0.66	1.31	1.33	1.36	0.95
Adjusted R2	0.07	0.36	0.45	0.47	0.46	0.46	0.01	0.22	0.47	0.46	0.50	0.55

Figure 1
QMJ: 4-Factor Adjusted Information Ratios

This figure shows 4-factor adjusted information ratios of Quality minus Junk (QMJ) factors. This figure includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Information ratios are equal to alpha divided by the standard deviation of the estimated residuals in the time-series regression. Information ratios are annualized.

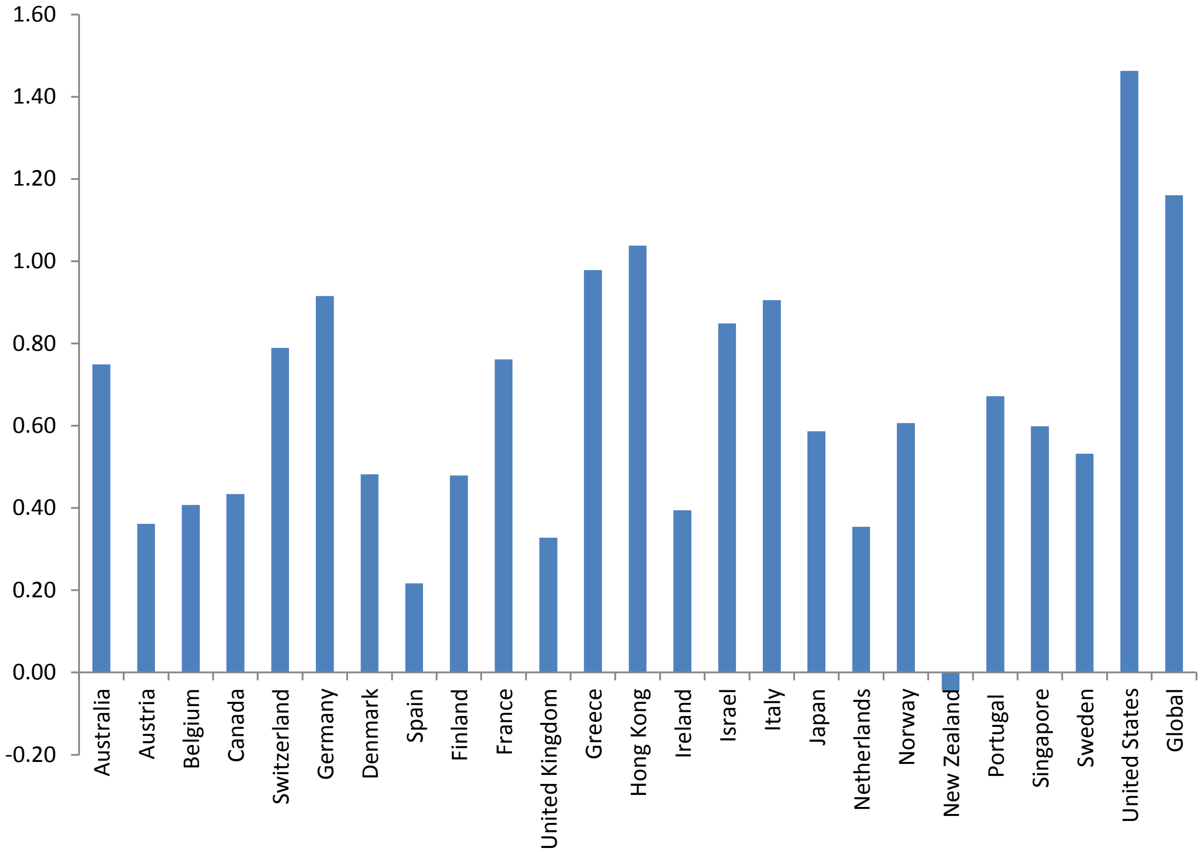
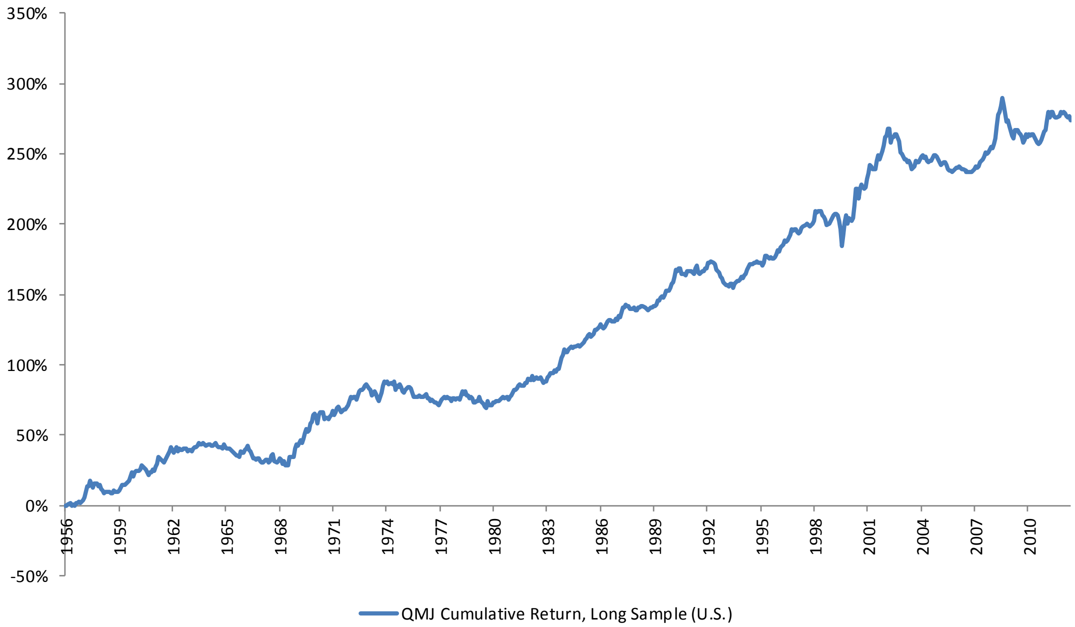


Figure 2
QMJ: Cumulative Returns

This figure shows cumulative returns of Quality minus Junk (QMJ) factors. This figure includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging.

Panel A: Long Sample (U.S. , 1956 - 2012)



Panel B: Broad Sample (Global , 1986 - 2012)

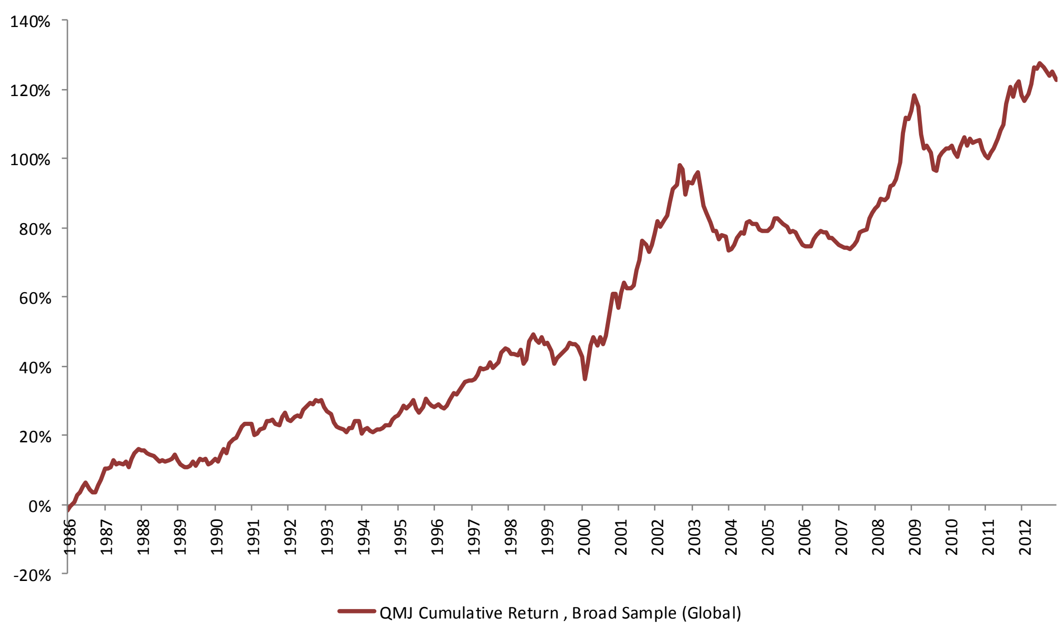
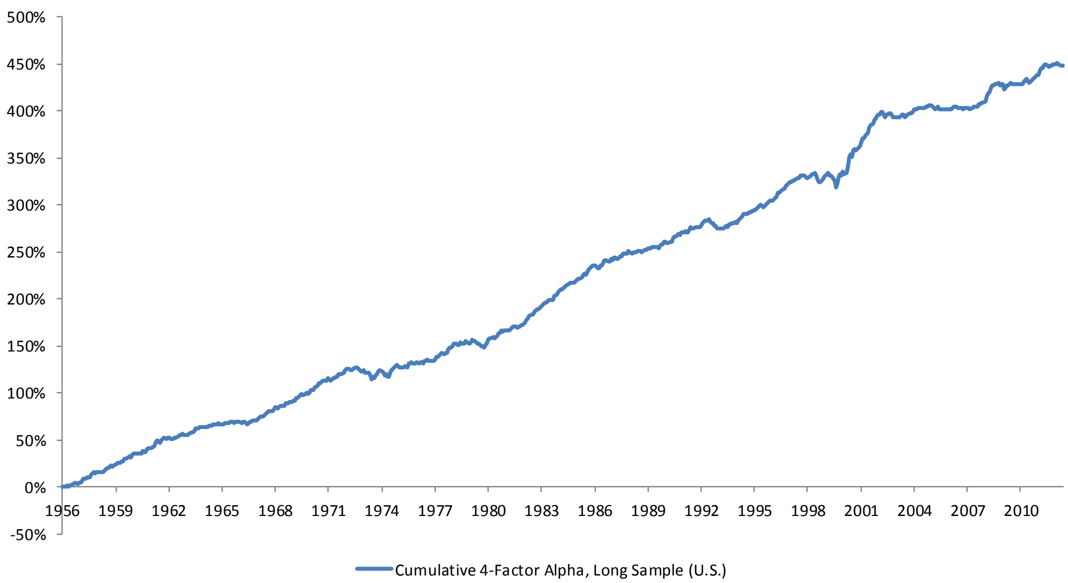


Figure 3
QMJ: Cumulative 4-Factor Alphas

This figure shows 4-factor adjusted cumulative returns of Quality minus Junk (QMJ) factors. This figure includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. We plot cumulative abnormal returns (alpha plus regression residual) from the time series regression.

Panel A: Long Sample (U.S. , 1956 - 2012)



Panel B: Broad Sample (Global , 1986 - 2012)

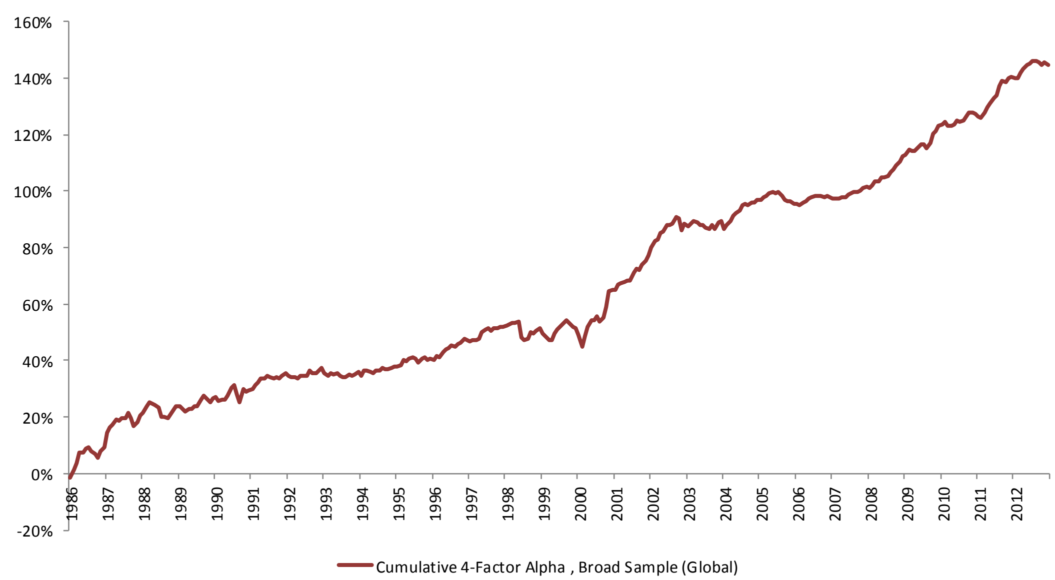
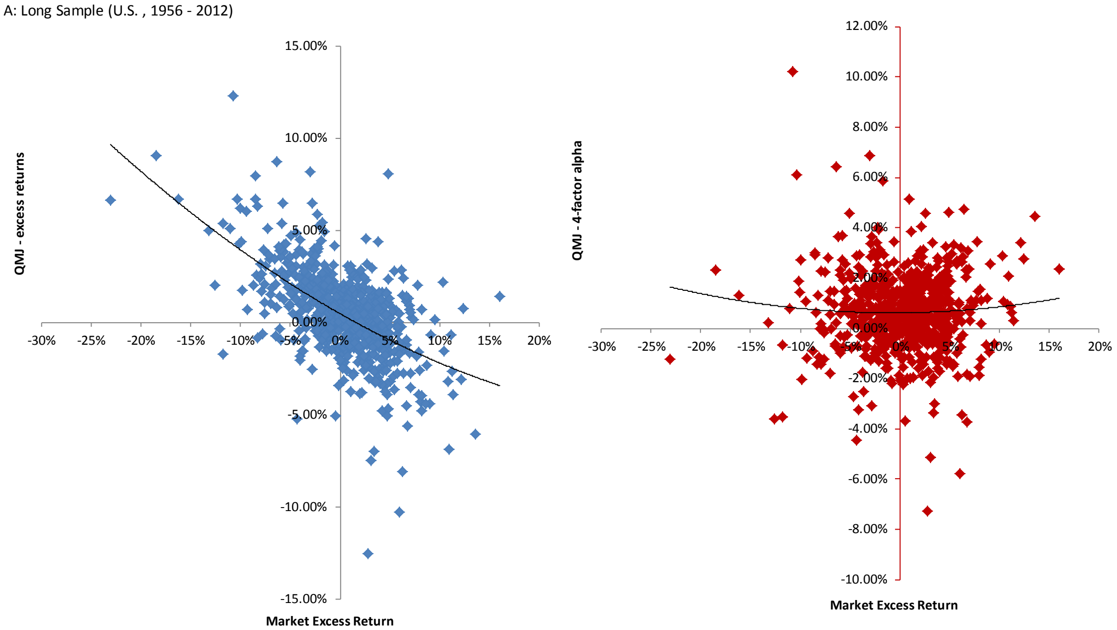


Figure 4
QMJ: Flight to Quality

This figure shows monthly excess returns and 4-factor alpha of Quality minus Junk (QMJ) factors. This figure includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Monthly excess returns and alphas on the y-axes and market excess returns on the x-axes.

Panel A: Long Sample (U.S. , 1956 - 2012)



Panel B: Broad Sample (Global, 1986 - 2012)

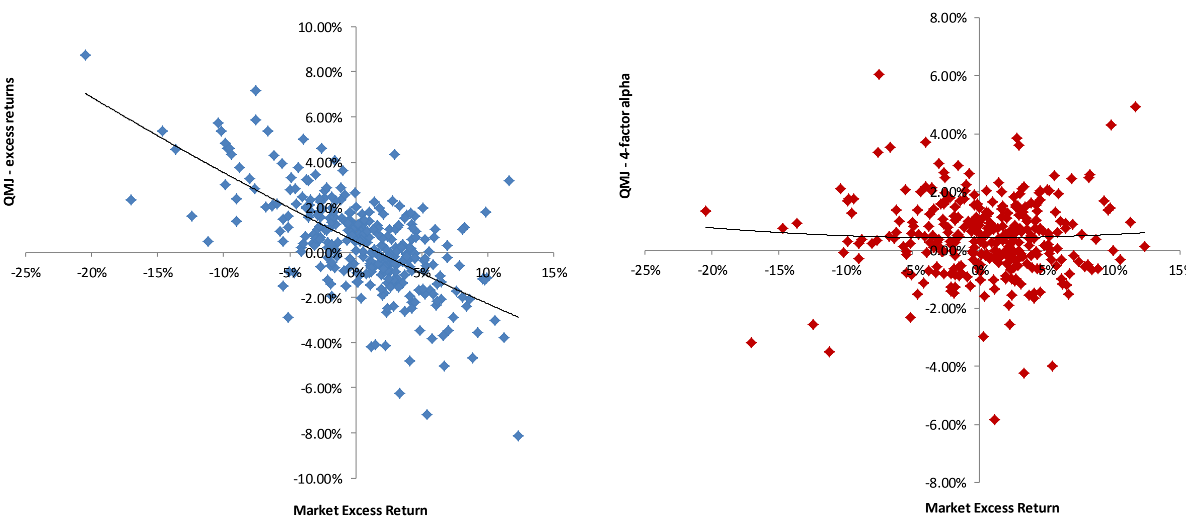
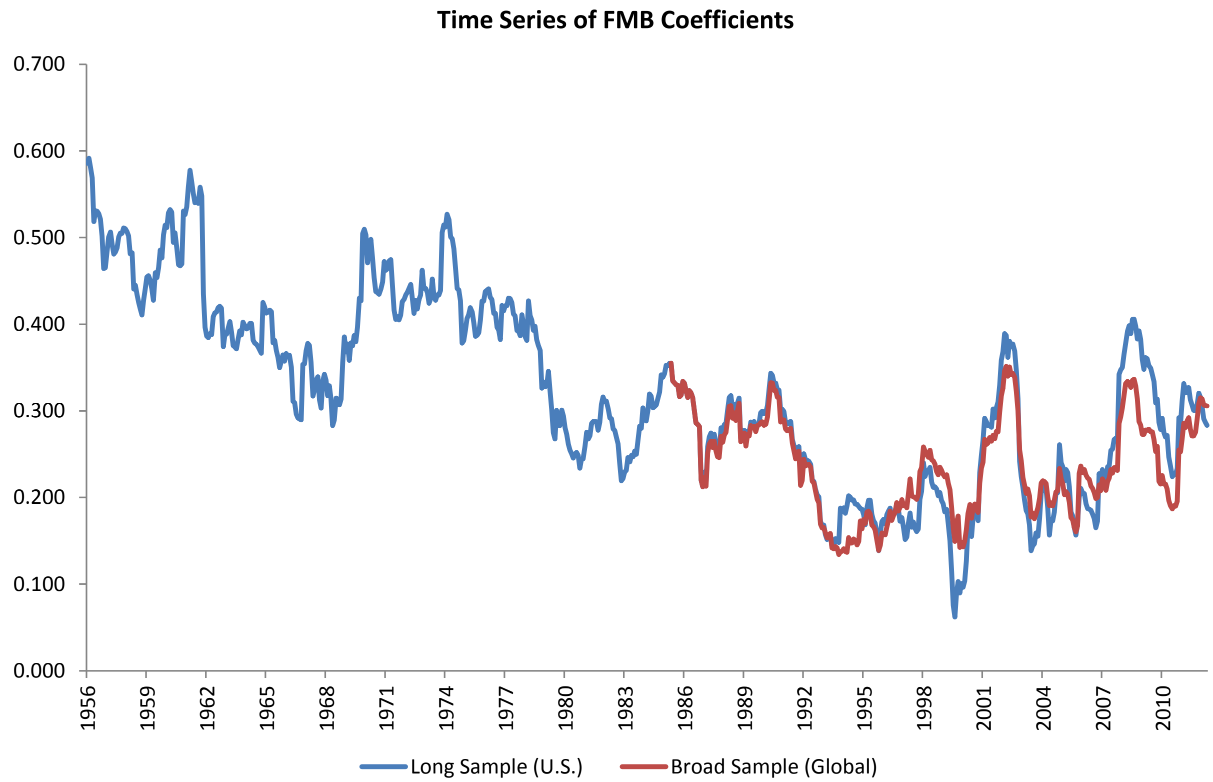


Figure 5
Cross Sectional Regressions Coefficient, the Price of Quality

This figure reports coefficients from Fama-Macbeth regressions. The dependent variable is the z-score of a stock's market to book ratio (MB) in month t. The explanatory variables are the quality scores in month t. We plot the time series of the cross sectional coefficients from table III, panel A, column (1) and (7).



Appendix A

A1: Variable Definitions

In this section we report details of each variable used on our quality score. Our variables' definitions are based on Altman (1968), Ohlson (1980), Ang, Hodrick, Xing, and Zhang (2006), Danile and Titman (2006), Penman, Richardson, and Tuna (2007), Campbell, Hilscher, and Szilagyi (2008), Chen, Novy-Marx and Zhang (2011), Novy-Marx (2012), Frazzini and Pedersen (2013) and Asness and Frazzini (2013). Variable names correspond to CRSP/XpressFeed data items and we omit the time subscript t for contemporaneous variables. Finally, unless specified, XpressFeed data items refer to annual items and time subscripts refer to years.

Profitability

We compute a profitability z-score by averaging z-scores of gross profits over assets (GPOA), return on equity (ROE), return on assets (ROA), cash flow over assets (CFOA), gross margin (GMAR) and low accruals (ACC):

$$\text{Profitabiliy} = \mathrm{z}\left(\mathrm{z}_{\mathrm{gpoa}} + \mathrm{z}_{\mathrm{roe}} + \mathrm{z}_{\mathrm{roa}} + \mathrm{z}_{\mathrm{cfoa}} + \mathrm{z}_{\mathrm{gmar}} + \mathrm{z}_{\mathrm{acc}}\right)$$

$GPOA$ is equal to revenue minus costs of goods sold divided by total assets $(RETV - COGS)\ /AT$. ROE is net income divided by book-equity IB/BE. ROA is net income divided by total assets IB/AT. $CFOA$ is net income plus depreciation minus changes in working capital and capital expenditures divided by total assets: $(NB + DP - \Delta WC - CAPX)\ /AT$. $GMAR$ is revenue minus costs of goods sold divided by total sales: $(RETV - COGS)\ /SALE$. ACC is depreciation minus changes in working capital $-(\Delta WC - DP)\ /AT$. Working capital WC is defined as current assets minus current liabilities minus cash and short term instruments plus short term debt and income taxes payable $ACT - LCT - CHE\ + DLC + TXP$. Book equity BE is defined as shareholders' equity minus preferred stock. To obtain shareholders' equity we use we use stockholders' equity (SEQ) but if not available, we use the sum of common equity (CEQ) and preferred stocks ($PSTK$). If both SEQ and CEQ are unavailable, we proxy shareholders' equity by total assets (AT) minus the sum of total liability (LT) and minority interest (MIB). To obtain book equity (BE), we subtract from shareholders' equity the preferred stock value ($PSTKRV$, $PSTKL$ or $PSTK$ depending on availability).

Growth

We compute a *growth* z-score by averaging z-scores of five-year growth in gross profits over assets $(GP_t - GP_{t-5})/AT_{t-5}$ where $GP = REVT - COGS$, five-year growth in return on equity $(IB_t - IB_{t-5})/BE_{t-5}$, five-year growth in return over assets $(IB_t - IB_{t-5})/AT_{t-5}$, five-year growth in cash flow over assets $(CF_t - CF_{t-5})/AT_{t-5}$ where $CF = IB + DP - \Delta WC - CAPX$, five-year growth in gross margin $(GP_t - GP_{t-5})/SALE_{t-5}$, and five-year growth in (low) accruals $(MWCPD_t - MWCPD_{t-5})/A_{t-5}$ where $MWCPD = -(\Delta WC - DP)$:

$$\text{Growth} = \text{z}\left(\text{z}_{\Delta\text{gpoa}} + \text{z}_{\Delta\text{roe}} + \text{z}_{\Delta\text{roa}} + \text{z}_{\Delta\text{cfoa}} + \text{z}_{\Delta\text{gmar}} + \text{z}_{\Delta\text{acc}}\right)$$

Safety

We compute a *safety* z-score by averaging z-scores of low beta (BAB), low idiosyncratic volatility (IVOL), low leverage (LEV), low bankruptcy risk (Ohlson's O and Altman's Z) and low earnings volatility (EVOL):

$$\text{Safety} = \text{z}(\text{z}_{\text{bab}} + \text{z}_{\text{ivol}} + \text{z}_{\text{lev}} + \text{z}_{\text{o}} + \text{z}_{\text{z}} + \text{z}_{\text{evol}})$$

BAB is equal to minus market beta $-\beta$. Betas are estimated as in Frazzini and Pedersen (2013) based on the product of the rolling one-year daily standard deviation and the rolling five-year three-day correlations. For correlations, we use three-day returns to account for nonsynchronous trading and a longer horizon because correlations are more stable than volatilities. $IVOL$ is minus a stock's idiosyncratic volatility $-\sigma^i$. Idiosyncratic volatility is equal to the rolling one-year standard deviation of daily beta-adjusted excess return, skipping the most recent trading day. LEV is minus total debt (the sum of long term debt, short term debt, minority interest and preferred stock) over total assets $-(DLTT + DLC + MIBT + PSTK)/AT$. We compute Ohlson's O-Score as

$$O = -(-1.32 - 0.407 * \log(\mathrm{ADJASSET/CPI}) + 6.03 * \mathrm{TLTA} - 1.43 * \mathrm{WCTA} + 0.076 * \mathrm{CLCA} - 1.72 * \mathrm{OENEG} - 2.37 * \mathrm{NITA} - 1.83 * \mathrm{FUTL} + 0.285 * \mathrm{INTWO} - 0.521 * \mathrm{CHIN});$$

where $ADJASSET$ is adjusted total assets equal to total assets plus 10% of the difference between book equity and market equity $AT + .1 * (ME - BE)$. CPI is the consumer price index. $TLTA$ is equal to book value of debt ($DLC + DLTT$) divided by $ADJASSET$. $WCTA$ is current assets minus current liabilities scaled by adjusted assets $(ACT - LCT)/ADJASSET$. $CLCA$ is current liabilities divided by current assets LCT/ACT. $OENEG$ is a dummy equal to 1 if total liabilities exceed total assets $1(LT > AT)$. $NITA$ is net income over assets IB/AT. $FUTL$ is pre-tax income over total liabilities PT/LT. $INTWO$ is a dummy equal to one if net income is negative for the current and prior fiscal year $1(MAX\{IB_t, IB_{t-1}\} < 0)$. $CHIN$ is changes in net income defined as $(IB_t - IB_{t-1})/(|IB|_t + |IB_{t-1}|)$. Altman's Z-Score is a weighted average of working capital, retained earnings, earnings before interest and taxes, market equity and sales, all over total assets:

$$\mathrm{Z} = (1.2\,\mathrm{WC} + 1.4\,\mathrm{RE} + 3.3\mathrm{EBIT} + 0.6\mathrm{ME} + \mathrm{SALE})/\mathrm{AT}$$

$EVOL$ is the standard deviation of quarterly ROE over the past 60 quarters. We require at least twelve non missing quarters. If quarterly data is unavailable we use the standard deviation of annual ROE over the past 5 years and we require five non missing fiscal years[1].

Payout

We compute a payout z-score by averaging z-scores of net equity issuance ($EISS$), net debt issuance ($DISS$) and total net payout over profits ($NPOP$):

$$\mathrm{Payout} = \mathrm{z}\left(\mathrm{z_{eiss}} + \mathrm{z_{diss}} + \mathrm{z_{npop}}\right)$$

[1] Quarterly data is unavailable for some of our international sample.

$EISS$ is minus one-year percent change in split-adjusted number of shares $-\log(SHROUT\_ADJ_t/SHROUT\_ADJ_{t-1})$ where $SHROUT\_ADJ$ is split-adjusted shares outstanding. $DISS$ is minus one-year percent change in total debt $-\log(TOTD_t/TOTD_{t-1})$ where $TOTD$ is the sum of long term debt, short term debt, minority interest and preferred stocks $DLTT + DLC + MIBT + PSTK$. $NPOP$ is equal the sum of total net payout (net income minus changes in book equity $IB - \Delta BE$) over the past 5 years divided by total profits ($RETV - COGS$) over the past 5 years.

Book-to-Market

Book-to-market ratios follow Asness and Frazzini (2013). We require stocks to have a positive book equity and compute book-to-market as book equity divided by the most recent market equity BE/ME.

A2: Global Factor Returns

In this section we report details of the construction of the market (MKT), size (SMB), book-to-market (HML), and momentum (UMD) portfolios used on the analysis. The data can be downloaded at http://www.econ.yale.edu/~af227/data_library.htm. The portfolio construction follows Fama and French (1992, 1993 and 1996) and Asness and Frazzini (2013). We form one set of portfolios in each country and compute global factor portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. The market factor MKT is the value-weighted return on all available stocks minus the one-month Treasury bill rate. The size, value and momentum factors are constructed using six value-weighted portfolios formed on size (market value of equity ME) and book-to-market (book equity divided by the most recent market equity BE/ME) and 1-year return (return over the prior 12 months, skipping the most recent month). At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on the second variable. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The size factor SMB is the average return on the 3 small portfolios minus the average return on the 3 big portfolios:

$$SMB = 1/3\ (Small\ Value + Small\ Neutral + Small\ Growth) - 1/3\ (Big\ Value + Big\ Neutral + Big\ Growth)$$

The value factors HML is the average return on the two value portfolios minus the average return on the two growth portfolios:

$$HML = 1/2\ (Small\ Value + Big\ Value) - 1/2\ (Small\ Growth + Big\ Growth)$$

The momentum factor UMD is the average return on the two high return portfolios minus the average return on the two low return portfolios:

$$UMD = 1/2\ (Small\ High + Big\ High) - 1/2(Small\ Low + Big\ Low)$$

Portfolio returns are in USD and do not include any currency hedging. Excess returns are above the U.S. Treasury bill rate.

Table A1
Persistence of Quality Measures

This table shows average quality scores. Each calendar month, stocks in each country in are ranked in ascending order on the basis of their profitability, growth, safety and payout. The ranked stocks are assigned to one of ten portfolios. U.S. sorts are based on NYSE breakpoints. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. This table reports the value-weighted average of quality measures across stocks in the portfolio at portfolio formation (t) up to the subsequent ten years (t + 120 months). We report the time series average of the value-weighted cross sectional means. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. The sample period runs from June 1986 to December 2012. Standard errors are adjusted for heterskedasticity and autocorrelation with a lag length of five years (Newey and West (1987)) and 5% significance is indicated in bold.

Panel A: Long Sample (U.S.) 1956 - 2012	P1 (Low)	P2	P3	P4	P5	P6	P7	P8	P9	P10 (High)	H-L	H-L t-stat
Profit (t)	-1.44	-0.80	-0.46	-0.20	0.03	0.25	0.49	0.76	1.11	1.76	**3.20**	63.62
Profit (t + 12M)	-0.90	-0.49	-0.28	-0.05	0.10	0.27	0.44	0.66	0.99	1.51	**2.41**	41.39
Profit (t + 36M)	-0.65	-0.40	-0.24	-0.03	0.11	0.23	0.37	0.56	0.82	1.40	**2.05**	31.26
Profit (t + 60M)	-0.56	-0.36	-0.17	-0.03	0.13	0.22	0.32	0.50	0.76	1.34	**1.90**	24.06
Profit (t + 120M)	-0.39	-0.22	-0.14	0.02	0.11	0.19	0.30	0.37	0.65	1.14	**1.53**	25.58
Growth (t)	-1.48	-0.97	-0.66	-0.38	-0.12	0.13	0.39	0.68	1.03	1.67	**3.15**	101.83
Growth (t + 12M)	-0.78	-0.60	-0.41	-0.21	-0.04	0.13	0.30	0.58	0.80	1.25	**2.03**	30.85
Growth (t + 36M)	-0.43	-0.38	-0.28	-0.17	-0.07	0.02	0.18	0.36	0.51	0.93	**1.36**	21.52
Growth (t + 60M)	0.01	-0.10	-0.12	-0.09	-0.08	-0.03	0.02	0.15	0.25	0.52	**0.51**	4.15
Growth (t + 120M)	-0.23	-0.25	-0.14	-0.10	-0.14	-0.12	-0.06	0.12	0.12	0.35	**0.58**	5.89
Safety (t)	-1.49	-0.85	-0.48	-0.21	0.01	0.22	0.44	0.69	0.99	1.45	**2.95**	49.61
Safety (t + 12M)	-1.11	-0.66	-0.34	-0.14	0.04	0.23	0.44	0.65	0.93	1.28	**2.39**	44.71
Safety (t + 36M)	-0.74	-0.49	-0.22	-0.07	0.06	0.24	0.42	0.58	0.81	1.04	**1.78**	20.97
Safety (t + 60M)	-0.56	-0.38	-0.11	-0.02	0.11	0.23	0.39	0.55	0.75	0.91	**1.46**	16.01
Safety (t + 120M)	-0.28	-0.20	-0.03	0.03	0.12	0.25	0.35	0.45	0.65	0.71	**0.98**	9.67
Payout (t)	-1.46	-0.82	-0.46	-0.17	0.07	0.30	0.54	0.80	1.11	1.57	**3.03**	70.25
Payout (t + 12M)	-0.67	-0.39	-0.20	0.00	0.20	0.36	0.50	0.66	0.81	0.95	**1.63**	38.22
Payout (t + 36M)	-0.38	-0.19	0.06	0.17	0.26	0.38	0.52	0.61	0.71	0.80	**1.18**	38.26
Payout (t + 60M)	-0.15	0.02	0.19	0.25	0.32	0.41	0.49	0.59	0.68	0.71	**0.86**	27.71
Payout (t + 120M)	0.12	0.22	0.33	0.26	0.40	0.43	0.49	0.53	0.57	0.58	**0.46**	14.43

Panel B: Broad Sample (Global) 1986 - 2012	P1 (Low)	P2	P3	P4	P5	P6	P7	P8	P9	P10 (High)	H-L	H-L t-stat
Profit (t)	-1.48	-0.86	-0.50	-0.22	0.02	0.26	0.51	0.78	1.13	1.72	**3.19**	68.73
Profit (t + 12M)	-0.91	-0.49	-0.24	-0.08	0.08	0.27	0.45	0.65	0.94	1.45	**2.36**	50.94
Profit (t + 36M)	-0.63	-0.36	-0.18	-0.03	0.09	0.24	0.37	0.56	0.78	1.29	**1.91**	44.82
Profit (t + 60M)	-0.46	-0.27	-0.10	0.02	0.13	0.25	0.36	0.50	0.69	1.19	**1.65**	34.78
Profit (t + 120M)	-0.31	-0.12	-0.02	0.08	0.15	0.24	0.35	0.41	0.58	0.98	**1.29**	17.41
Growth (t)	-1.50	-1.01	-0.69	-0.41	-0.15	0.11	0.37	0.66	1.03	1.68	**3.18**	57.38
Growth (t + 12M)	-0.71	-0.53	-0.40	-0.21	-0.07	0.13	0.29	0.54	0.75	1.23	**1.94**	41.03
Growth (t + 36M)	-0.29	-0.27	-0.24	-0.13	-0.06	0.07	0.15	0.30	0.48	0.80	**1.08**	23.00
Growth (t + 60M)	0.19	-0.04	-0.11	-0.08	-0.09	-0.04	0.03	0.11	0.19	0.38	**0.18**	4.35
Growth (t + 120M)	-0.19	-0.21	-0.14	-0.11	-0.15	-0.14	-0.12	0.04	0.11	0.18	**0.37**	5.83
Safety (t)	-1.58	-0.92	-0.54	-0.25	0.00	0.22	0.45	0.69	1.01	1.51	**3.09**	62.54
Safety (t + 12M)	-1.06	-0.66	-0.38	-0.15	0.02	0.23	0.39	0.61	0.89	1.25	**2.31**	61.28
Safety (t + 36M)	-0.63	-0.45	-0.26	-0.10	0.02	0.17	0.31	0.47	0.72	0.93	**1.55**	37.58
Safety (t + 60M)	-0.45	-0.34	-0.17	-0.07	0.03	0.11	0.23	0.39	0.60	0.79	**1.24**	26.36
Safety (t + 120M)	-0.21	-0.17	-0.09	-0.02	0.05	0.12	0.18	0.29	0.49	0.55	**0.77**	13.00
Payout (t)	-1.51	-0.86	-0.48	-0.19	0.06	0.30	0.54	0.81	1.13	1.60	**3.12**	54.93
Payout (t + 12M)	-0.54	-0.27	-0.12	0.07	0.24	0.34	0.52	0.64	0.76	0.90	**1.43**	54.37
Payout (t + 36M)	-0.25	-0.05	0.11	0.21	0.31	0.39	0.50	0.58	0.65	0.73	**0.98**	32.25
Payout (t + 60M)	-0.02	0.15	0.25	0.35	0.38	0.43	0.50	0.54	0.60	0.65	**0.68**	18.32
Payout (t + 120M)	0.16	0.26	0.36	0.31	0.42	0.45	0.49	0.50	0.51	0.59	**0.43**	7.42

Table A2
Quality Minus Junk Components

This table shows calendar-time portfolio returns and factor loadings. Quality minus Junk (QMJ) factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. Portfolios based on profitability, growth, safety and payout score are constructed in a similar manner. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. Panel C report results by country. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios are annualized.

	Panel A: Long Sample (U.S. , 1956 - 2012)					Panel B: Broad Sample (Global , 1986 - 2012)				
	High Quality		Low Quality		QMJ	High Quality		Low Quality		QMJ
	Small	Big	Small	Big		Small	Big	Small	Big	
Excess Returns	**0.92**	**0.56**	0.36	0.30	**0.40**	**0.75**	**0.50**	0.19	0.30	**0.38**
	(4.70)	(3.44)	(1.30)	(1.51)	(4.38)	(2.95)	(2.10)	(0.54)	(0.96)	(3.22)
CAPM-alpha	**0.43**	**0.12**	**-0.31**	**-0.24**	**0.55**	**0.32**	0.08	**-0.38**	**-0.24**	**0.52**
	(4.85)	(2.80)	(-2.23)	(-4.57)	(7.27)	(3.37)	(1.35)	(-2.45)	(-3.22)	(5.75)
3-factor alpha	**0.25**	**0.21**	**-0.59**	**-0.32**	**0.68**	**0.21**	**0.17**	**-0.52**	**-0.32**	**0.61**
	(5.79)	(6.05)	(-9.70)	(-6.71)	(11.10)	(3.55)	(3.10)	(-5.10)	(-4.50)	(7.68)
4-factor alpha	**0.31**	**0.27**	**-0.40**	**-0.34**	**0.66**	**0.25**	**0.14**	**-0.23**	**-0.26**	**0.45**
	(6.91)	(7.56)	(-6.67)	(-6.83)	(10.20)	(4.00)	(2.51)	(-2.33)	(-3.43)	(5.50)
MKT	**0.90**	**0.93**	**1.19**	**1.14**	**-0.25**	**0.85**	**0.90**	**1.11**	**1.13**	**-0.24**
	(87.91)	(115.82)	(86.43)	(99.31)	(-17.02)	(64.43)	(75.37)	(53.65)	(71.27)	(-14.36)
SMB	**0.70**	**-0.18**	**1.15**	**0.12**	**-0.38**	**0.61**	**-0.20**	**1.00**	0.06	**-0.33**
	(46.84)	(-15.27)	(57.17)	(7.32)	(-17.50)	(22.42)	(-8.22)	(23.61)	(1.94)	(-9.46)
HML	**0.07**	**-0.18**	-0.02	**0.16**	**-0.12**	**0.10**	**-0.13**	**-0.13**	**0.12**	-0.01
	(4.23)	(-13.21)	(-0.87)	(8.51)	(-5.03)	(3.67)	(-5.26)	(-2.89)	(3.54)	(-0.31)
UMD	**-0.06**	**-0.06**	**-0.17**	0.02	0.02	-0.04	0.02	**-0.27**	**-0.06**	**0.15**
	(-4.15)	(-5.28)	(-9.14)	(1.49)	(0.82)	(-1.88)	(1.05)	(-7.98)	(-2.18)	(5.54)
Sharpe Ratio	0.63	0.46	0.17	0.20	0.58	0.57	0.40	0.10	0.19	0.62
Information Ratio (4-factor)	0.99	1.08	-0.96	-0.98	1.46	0.84	0.53	-0.49	-0.72	1.16
Adjusted R-square	0.95	0.96	0.96	0.95	0.57	0.95	0.95	0.93	0.95	0.60

Table A3
Robustness Checks: QMJ by Time Period and by Size

This table shows calendar-time portfolio returns and factor loadings. Quality minus Junk (QMJ) factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. Portfolios based on profitability, growth, safety and payout score are constructed in a similar manner. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. Panel C report results by country. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios are annualized.

Panel A: QMJ by Sub-period	Universe	Sample Period	Firm Size	Excess return	T-stat Excess return	4-factor alpha	T-stat Alpha	Sharpe Ratio	Information Ratio (4-factor)	Number of months
Long Sample	United States	1956 - 1985	All	**0.34**	3.35	**0.72**	9.70	0.62	2.01	354
Long Sample	United States	1986 - 2005	All	**0.50**	2.82	**0.67**	5.22	0.63	1.28	240
Long Sample	United States	2006 - 2012	All	0.37	1.13	**0.55**	3.26	0.43	1.27	84
Broad Sample	Global	1986 - 2005	All	**0.32**	2.54	**0.31**	2.99	0.57	0.76	240
Broad Sample	Global	2006 - 2012	All	**0.54**	1.97	**0.69**	7.62	0.74	3.07	84

Panel B : QMJ by Size Decile	Universe	Sample Period	Excess return	T-stat Excess return	4-factor alpha	T-stat Alpha	Sharpe Ratio	Information Ratio	Number of months
P1 (small)	United States	1956 - 1985	**0.86**	5.41	**0.90**	6.87	0.72	0.98	678
P2	United States	1956 - 1985	**0.51**	3.83	**0.61**	5.82	0.51	0.83	678
P3	United States	1957 - 1985	**0.43**	3.26	**0.60**	5.48	0.43	0.79	678
P4	United States	1958 - 1985	**0.52**	4.41	**0.70**	6.93	0.59	0.99	678
P5	United States	1959 - 1985	**0.39**	3.49	**0.60**	6.00	0.46	0.86	678
P6	United States	1960 - 1985	**0.22**	2.14	**0.40**	4.21	0.28	0.60	678
P7	United States	1961 - 1985	**0.33**	3.22	**0.52**	5.37	0.43	0.77	678
P8	United States	1962 - 1985	**0.36**	3.66	**0.59**	6.03	0.49	0.86	678
P9	United States	1963 - 1985	**0.25**	2.87	**0.48**	5.34	0.38	0.77	678
P10 (Large)	United States	1964 - 1985	**0.33**	3.26	**0.66**	7.22	0.43	1.04	678
P1 (small)	Global	1986 - 2012	**0.91**	3.98	**0.77**	3.64	0.77	0.77	324
P2	Global	1987 - 2012	**1.15**	2.50	0.58	1.20	0.48	0.25	324
P3	Global	1988 - 2012	**0.73**	4.89	**0.73**	6.03	0.94	1.27	324
P4	Global	1989 - 2012	**0.63**	4.47	**0.65**	5.55	0.86	1.17	324
P5	Global	1990 - 2012	**0.45**	3.32	**0.44**	3.97	0.64	0.84	324
P6	Global	1991 - 2012	**0.46**	3.79	**0.48**	4.55	0.73	0.96	324
P7	Global	1992 - 2012	**0.44**	3.60	**0.46**	4.38	0.69	0.93	324
P8	Global	1993 - 2012	**0.33**	2.52	**0.44**	3.54	0.49	0.75	324
P9	Global	1994 - 2012	**0.29**	2.71	**0.41**	4.13	0.52	0.87	324
P10 (Large)	Global	1995 - 2012	0.24	1.83	**0.53**	5.03	0.35	1.06	324

Table A4
Robustness Checks: QMJ among Small and Large by Country

This table shows calendar-time portfolio returns and factor loadings. Quality minus Junk (QMJ) factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. Portfolios based on profitability, growth, safety and payout score are constructed in a similar manner. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. Panel C report results by country. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios are annualized.

	Panel A: Small Cap						Panel B: Large Cap					
	Excess return	T-stat Excess return	4-factor Alpha	T-stat Alpha	Sharpe Ratio	Information Ratio (4-factor)	Excess return	T-stat Excess return	4-factor Alpha	T-stat Alpha	Sharpe Ratio	Information Ratio (4-factor)
Australia	0.19	0.73	0.37	1.35	0.17	0.37	0.49	1.66	**0.73**	2.81	0.40	0.77
Austria	0.16	0.34	0.28	0.63	0.08	0.16	0.27	0.78	0.49	1.62	0.19	0.41
Belgium	-0.01	-0.02	0.05	0.13	-0.01	0.03	**0.87**	3.56	**0.66**	2.75	0.85	0.71
Canada	0.56	1.93	0.25	0.88	0.38	0.19	**0.67**	3.04	**0.53**	2.59	0.60	0.55
Switzerland	0.33	0.76	**0.72**	2.10	0.18	0.52	0.45	1.75	**0.55**	2.40	0.42	0.60
Germany	-0.03	-0.11	0.46	1.74	-0.03	0.45	**1.00**	4.01	**0.72**	3.18	0.96	0.82
Denmark	0.16	0.31	-0.10	-0.23	0.08	-0.06	**1.16**	3.79	**1.07**	3.72	0.92	0.94
Spain	-0.16	-0.46	-0.04	-0.12	-0.11	-0.03	0.47	1.42	0.43	1.47	0.34	0.36
Finland	0.45	0.69	0.48	0.95	0.16	0.24	**0.61**	2.05	**0.70**	2.37	0.49	0.59
France	0.42	1.25	**0.59**	2.19	0.30	0.56	**0.48**	2.06	**0.46**	2.25	0.49	0.58
United Kingdom	-0.06	-0.26	0.26	1.33	-0.06	0.32	0.41	0.98	0.39	0.87	0.22	0.21
Greece	1.18	1.59	0.89	1.58	0.49	0.50	**1.53**	2.93	**1.22**	3.35	0.90	1.07
Hong Kong	0.72	1.90	**1.20**	4.17	0.45	1.04	0.50	1.08	**0.84**	2.24	0.26	0.56
Ireland	0.09	0.09	1.22	1.62	0.02	0.40	0.97	1.26	0.47	0.69	0.30	0.17
Israel	0.63	1.14	**0.98**	2.02	0.34	0.64	0.68	1.93	**0.72**	2.14	0.57	0.68
Italy	0.55	1.60	**0.61**	2.42	0.39	0.61	**0.89**	2.43	**0.78**	2.51	0.60	0.63
Japan	0.09	0.38	0.31	1.39	0.08	0.34	0.35	1.47	**0.45**	2.77	0.32	0.68
Netherlands	-0.32	-0.80	0.07	0.20	-0.19	0.05	0.51	1.56	**0.61**	2.01	0.37	0.50
Norway	0.50	1.21	0.50	1.24	0.29	0.30	0.72	1.94	**0.87**	2.78	0.46	0.68
New Zealand	0.37	0.76	0.24	0.47	0.18	0.12	-0.23	-0.65	-0.35	-0.98	-0.16	-0.25
Portugal	0.62	1.09	0.69	1.37	0.31	0.40	1.10	1.85	1.09	1.95	0.52	0.57
Singapore	-0.21	-0.47	0.22	0.69	-0.11	0.17	**0.73**	2.65	**0.66**	2.69	0.63	0.68
Sweden	0.10	0.26	0.45	1.51	0.06	0.34	**0.71**	2.42	**0.55**	2.03	0.52	0.46
United States	**0.25**	2.70	**0.61**	8.23	0.36	1.18	**0.55**	4.77	**0.71**	8.23	0.63	1.18
Global	0.20	1.60	**0.41**	4.36	0.31	0.92	**0.56**	3.98	**0.49**	4.60	0.77	0.97

Table A5
QMJ, Alternative Definition, Averaging Portfolios

This table shows calendar-time portfolio returns and factor loadings. Portfolios are constructed as the intersection of six value-weighted portfolios formed on size and a quality measure. At the end of each calendar month, stocks are assigned to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The factor return is the average return on the two high quality portfolios minus the average return on the two low quality (junk) portfolios. We build one portfolio for each measure and average the portfolio return to obtain a QMJ factor $QMJ = (Profitability + Growth + Safety + Payout)/4$ where $ility = (GPOA + ROE + ROA + CFOA + GMAR + ACC)/6$, $Growth = Profitability = (\Delta GPOA + \Delta ROE + \Delta ROA + \Delta CFOA + \Delta GMAR + \Delta ACC)/6$, $safety = (BAB + IVOL + LEV + O + Z)/6$ and $payout = (EISS + DISS + NPOP)$. We form one set of portfolios in each country and compute global portfolios by weighting each country's portfolio by the country's total (lagged) market capitalization. This table includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Panel A reports results from our *Long Sample* of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our *Broad Sample* of global stocks. Panel C report results by country. The sample period runs from June 1986 to December 2012. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Returns and alphas are in monthly percent, t-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Information ratio is equal to 4-factor alpha (intercept) divided by the standard deviation of the estimated residuals in the time-series regression. Sharpe ratios and information ratios are annualized.

	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	**0.16**	**0.17**	0.14	**0.12**	**0.21**	**0.19**	**0.25**	0.13	0.06	**0.33**
	(3.96)	(4.01)	(1.91)	(2.44)	(3.49)	(3.49)	(4.37)	(1.51)	(0.99)	(4.11)
CAPM-alpha	**0.22**	**0.21**	**0.27**	**0.10**	**0.31**	**0.25**	**0.31**	**0.24**	0.06	**0.41**
	(6.37)	(5.01)	(4.70)	(2.00)	(6.23)	(5.69)	(6.11)	(3.45)	(0.99)	(6.35)
3-factor alpha	**0.28**	**0.28**	**0.36**	**0.19**	**0.29**	**0.30**	**0.38**	**0.32**	**0.15**	**0.37**
	(10.32)	(8.42)	(8.00)	(4.69)	(6.97)	(8.37)	(9.20)	(5.71)	(3.08)	(6.28)
4-factor alpha	**0.27**	**0.33**	**0.31**	**0.30**	**0.15**	**0.26**	**0.37**	**0.22**	**0.26**	**0.19**
	(9.46)	(9.19)	(6.63)	(7.55)	(3.63)	(6.77)	(8.41)	(3.85)	(5.19)	(3.30)
MKT	**-0.10**	**-0.06**	**-0.22**	**0.02**	**-0.14**	**-0.11**	**-0.10**	**-0.18**	-0.01	**-0.14**
	(-14.98)	(-7.90)	(-19.87)	(2.19)	(-14.39)	(-13.31)	(-10.69)	(-14.88)	(-0.75)	(-11.94)
SMB	**-0.17**	**-0.15**	**-0.30**	**-0.05**	**-0.20**	**-0.20**	**-0.19**	**-0.30**	**-0.13**	**-0.16**
	(-18.13)	(-12.44)	(-18.81)	(-4.07)	(-14.43)	(-11.89)	(-9.96)	(-11.86)	(-6.26)	(-6.82)
HML	**-0.06**	**-0.16**	**-0.06**	**-0.30**	**0.26**	**-0.04**	**-0.12**	**-0.06**	**-0.28**	**0.28**
	(-5.84)	(-11.96)	(-3.19)	(-19.61)	(16.50)	(-2.63)	(-6.26)	(-2.18)	(-12.74)	(11.32)
UMD	0.01	**-0.04**	**0.04**	**-0.11**	**0.14**	**0.04**	0.01	**0.09**	**-0.10**	**0.17**
	(0.83)	(-3.56)	(2.91)	(-8.70)	(10.41)	(3.20)	(0.44)	(4.54)	(-6.01)	(9.05)
Sharpe Ratio	0.53	0.53	0.25	0.32	0.46	0.67	0.84	0.29	0.19	0.79
Information Ratio	1.36	1.32	0.95	1.08	0.52	1.43	1.78	0.81	1.10	0.70
Adjusted R2	0.56	0.40	0.63	0.42	0.60	0.59	0.52	0.64	0.39	0.58

Table A6
Time Variation of the Price of Quality: High Price of Quality Predicts Low QMJ Returns. Using raw Book-to-Market

This table shows time series regression of future factor returns on lagged cross sectional regression coefficients. The left hand side is the future cumulative excess return (or cumulative 4-factor alphas) of the QMJ factor (or profitability, growth, safety and payout factor). Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. The right hand side variables are the lagged cross sectional regression coefficient of log of market to book on quality z-score. The prior return is defined as the portfolio–weighted average of the past 1-year returns of the stocks in the portfolio. Panel A reports results from our Long Sample of domestic stocks. The sample period runs from June 1956 to December 2012. Panel B reports results from our Broad Sample of global stocks. The sample period runs from June 1986 to December 2012. We report the coefficient on the lagged cross sectional regression slope. T-statistics are shown below the coefficient estimates, and 5% statistical significance is indicated in bold. Standard errors are adjusted for heteroskedasticity and autocorrelation (Newey and West (1987)) with lag length equal to the forecasting horizon. "Mean Adj R2" is the average adjusted r-squared across all the regression above. The intercept and prior returns are included in all regressions but not reported.

	Panel A: Long Sample (U.S. , 1956 - 2012)								Panel B: Broad Sample (Global, 1986 - 2012)							
Left-hand side	Return (t)		Return (t, t+12)		Return (t, t+36)		Return (t, t+60)		Return (t)		Return (t, t+12)		Return (t, t+36)		Return (t, t+60)	
	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha	Raw	Alpha
QMJ	**-0.04**	-0.01	**-0.42**	**-0.24**	**-1.19**	**-0.79**	**-1.83**	**-2.50**	-0.02	0.01	-0.27	0.12	-0.46	0.37	**-0.69**	**-2.09**
	(-2.63)	(-1.68)	(-3.22)	(-2.19)	(-4.05)	(-2.35)	(-3.11)	(-4.79)	(-0.67)	(1.34)	(-1.79)	(1.24)	(-1.58)	(1.47)	(-2.23)	(-5.30)
Profitability	**-0.03**	-0.01	**-0.37**	**-0.22**	**-1.28**	**-0.81**	**-1.65**	**-2.35**	0.01	**0.03**	-0.10	**0.20**	-0.42	0.36	**-1.20**	**-2.59**
	(-2.58)	(-1.63)	(-3.64)	(-2.36)	(-6.22)	(-3.07)	(-3.55)	(-6.81)	(0.39)	(2.53)	(-0.63)	(2.06)	(-0.85)	(1.12)	(-2.41)	(-5.22)
Growth	**-0.03**	0.00	**-0.44**	-0.12	**-1.32**	-0.16	0.15	**-1.67**	-0.03	0.01	**-0.40**	-0.07	**-1.26**	-0.66	**-1.65**	**-1.67**
	(-2.14)	(-0.14)	(-3.13)	(-0.99)	(-3.10)	(-0.37)	(0.20)	(-2.19)	(-1.28)	(0.48)	(-2.48)	(-0.48)	(-2.20)	(-1.35)	(-3.40)	(-4.89)
Safety	**-0.04**	0.00	**-0.48**	-0.17	**-1.42**	-0.81	-1.64	**-2.38**	-0.04	0.00	**-0.35**	0.05	**-0.68**	**0.24**	0.21	**-0.84**
	(-2.37)	(-0.50)	(-3.44)	(-1.69)	(-4.82)	(-1.57)	(-1.36)	(-3.33)	(-1.33)	(0.45)	(-2.43)	(0.95)	(-3.26)	(1.97)	(0.66)	(-3.42)
Payout	**-0.05**	-0.02	**-0.49**	-0.13	**-0.95**	-0.46	**-1.35**	**-2.06**	**-0.06**	-0.01	-0.48	0.01	-0.39	0.11	-0.66	**-1.23**
	(-2.31)	(-1.61)	(-2.85)	(-0.95)	(-2.07)	(-1.87)	(-2.66)	(-2.80)	(-2.11)	(-0.83)	(-1.89)	(0.10)	(-0.68)	(0.26)	(-1.53)	(-4.08)
Mean Adj R2	0.01	0.00	0.12	0.07	0.28	0.16	0.19	0.33	0.01	0.00	0.09	0.03	0.26	0.11	0.21	0.37

Figure A1
QMJ: 4-Factor Adjusted Information Ratios by Size

This figure shows 4-factor adjusted information ratios of Quality minus Junk (QMJ) factors. This figure includes all available common stocks on the CRSP/Xpressfeed merged database for the markets listed in Table I. For U.S. securities, the size breakpoint is the median NYSE market equity. For International securities the size breakpoint is the 80th percentile by country. Alpha is the intercept in a time-series regression of monthly excess return. The explanatory variables are the monthly returns from the market portfolio (MKT) and size (SMB), book-to-market (HML), and momentum (UMD) factor-mimicking portfolios. Returns are in USD, do not include currency hedging, and excess returns are above the U.S. Treasury bill rate. Information ratios are equal to alpha divided by the standard deviation of the estimated residuals in the time-series regression. Information ratios are annualized.

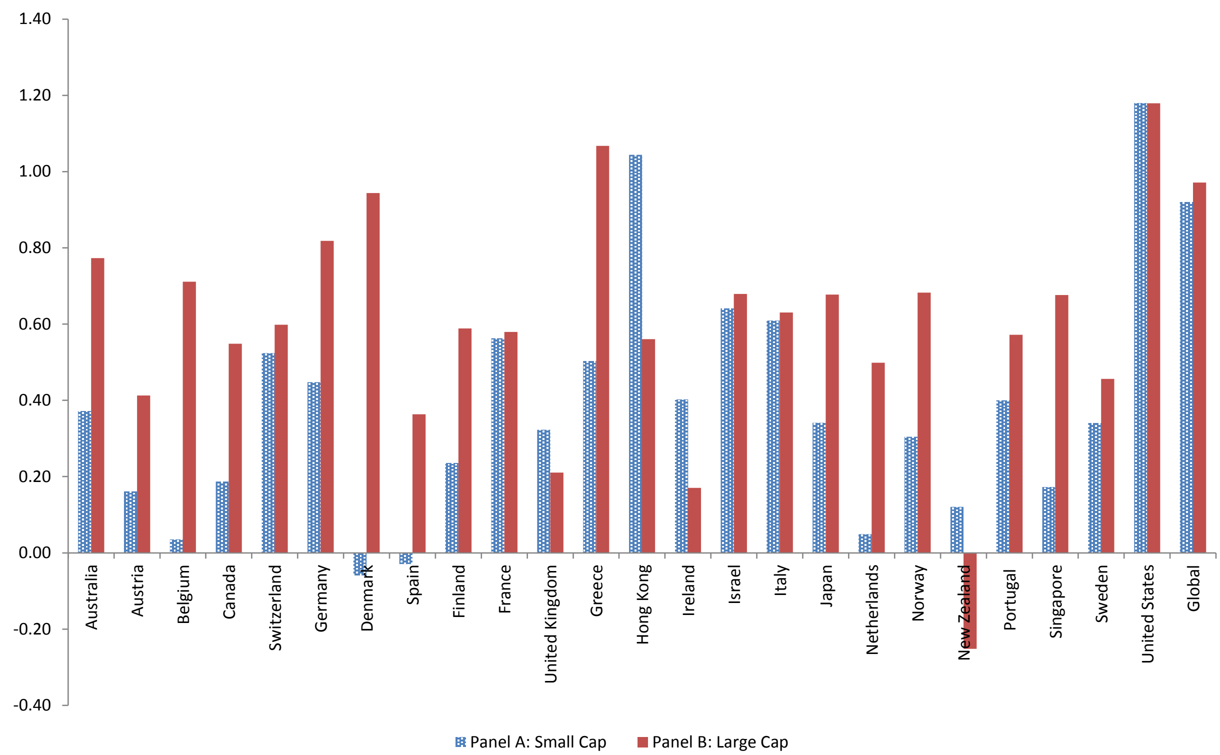


Figure A2
Cross Sectional Regressions Coefficient, the Price of Quality

This figure reports coefficients from Fama-Macbeth regressions. The dependent variable is the z-score of a stock's market to book ratio (MB) in month t. The explanatory variables are the quality scores in month t. We plot the time series of the cross sectional coefficients from table III, panel A, column (1) and (7) .