Anomalies Abroad: Beyond Data Mining

by*

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Abstract

A pre-specified set of nine prominent U.S. equity return anomalies produce significant alphas in Canada, France, Germany, Japan, and the U.K. All of the anomalies are consistently significant across these five countries, whose developed stock markets afford the most extensive data. The anomalies remain significant even in a test that assumes their true alphas equal zero in the U.S. Consistent with the view that anomalies reflect mispricing, idiosyncratic volatility exhibits a strong negative relation to return among stocks that the anomalies collectively identify as overpriced, similar to results in the U.S.

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1. Introduction

The attention received by equity return anomalies can span a wide range. At one extreme, much influential research can follow an anomaly's discovery. A notable example is the book-to-market ratio, appearing as a return anomaly in the finance literature as early as the study by Rosenberg, Reid, and Lanstein (1985). Book-to-market is subsequently used by Fama and French (1993) to construct the popular three-factor model, and it is the focus of numerous theoretical studies addressing the "value" effect.

In contrast, many of the anomalies reported in the literature are likely to receive scant additional attention. One reason, aside from the finance profession's satiation with hundreds of anomalies, is the recently heightened concern that many anomalies are spurious, essentially the outcomes of data mining (e.g., Harvey, Liu, and Zhu (2016); Linnainmaa and Roberts (2016); and Hou, Xue, and Zhang (2017)).

A natural approach for investigating whether an anomaly is spurious is to examine its returns in samples different from where it was discovered. Indeed, book-to-market's popularity owes in part to its robustness in additional countries and time periods (e.g., Fama and French (1998) and Davis, Fama, and French (2000)). Anomalies are not created equal, however. Some have greater in-sample magnitudes and consistency across subsamples, and some have stronger economic or behavioral motivations. If a large number of anomalies are treated equally as data-mining suspects when examining out-of-sample returns, then concluding that many of the anomalies are spurious is perhaps unsurprising. Few would argue that the profession's collective efforts to discover anomalies do not amount to at least some degree of data mining. If all anomalies are then tarred with the same data-mining brush, though, any genuine ones also get dismissed. Asking whether data mining is a major issue for a large set of anomalies is different from asking the same question for a small set of particular interest. Of course, the latter set must be credibly chosen ex ante.

This study considers a pre-specified set of prominent U.S. anomalies and examines their performance in Canada, France, Germany, Japan, and the U.K. The anomalies come from the eleven used by Stambaugh, Yu, and Yuan (2012, 2014, 2015). The five countries above have well developed stock markets whose data best enable the construction of the anomaly variables, but data limitations nevertheless necessitate dropping two of the anomalies, leaving nine: net stock issuance, composite equity issuance, accruals, net operating assets, asset growth, investment to assets, momentum, gross profitability, and return on assets.[1] This set

[1]The two anomalies dropped from the original eleven are distress and O-score.

of anomalies satisfies the key requirement that it be determined ex ante with respect to our investigation.

The nine anomalies produce consistently significant abnormal returns in the five countries. For each anomaly we compute alphas for the spread between the top and bottom quintiles, within each country and averaged across countries. The cross-country average alpha for asset-growth, although weaker than the other eight anomalies, has the same sign as its US counterpart and is significant in a one-sided test. Its monthly Fama-French three-factor alpha is 13 basis points (bps) with a t-statistic of 1.72. For the other eight anomalies, the cross-country average monthly alphas range between 28 and 151 bps, with t-statistics from 3.15 to 9.50. Not only do the anomalies produce significant alphas averaged across countries, but the overwhelming majority of the country-specific alphas for the anomalies are economically and statistically significant as well. Of those 45 alphas (9 anomalies, 5 countries), only 3 (though all insignificant) have a sign opposite the US counterpart, and 31 have t-statistics of at least 2.00. The results are qualitatively the same using just a single market factor or no factor to adjust returns.

The anomalies are significant in the five non-U.S. countries even if one assumes their significance in the U.S. data reflects data mining. Our sample period, 1980 through 2015, largely overlaps the U.S. history for which the anomalies are originally reported. In that respect our analysis is not strictly out-of-sample. For example, suppose the true alpha on an anomaly is zero in both the U.S. and the U.K. If the anomaly's U.K. abnormal return is positively correlated with its U.S. counterpart, and if the U.S. estimated alpha is positive, then one expects the U.K. alpha estimated in the same sample period to be positive as well. In other words, with cross-country correlation of an anomaly's returns, inferences about that anomaly's significance abroad are potentially susceptible to U.S. data mining. We include a control for this possibility when judging the anomalies' significance.

Our test that controls for U.S. data mining is especially strict. We ask whether an anomaly's sample alpha in another country is significant, conditional on the U.S. sample alpha and an assumption that the anomaly's true U.S. alpha equals zero. The test is easily implemented by including the U.S. anomaly's abnormal return as an additional right-hand-side factor when estimating the anomaly's alpha in the other country. The test is strict, in that it will too often fail to detect an anomaly in another country if the anomaly truly exists in the U.S. Nevertheless, most of the anomalies also clear this high hurdle in each of the five countries.

We also combine the nine anomalies into a single composite. The results further support

the anomalies' overall significance. Following the approach of Stambaugh, Yu, and Yuan (2015), we rank stocks based on a mispricing measure constructed each month as a stock's average, across anomalies, of its percentile when ranked on each anomaly variable. As those authors explain, averaging rankings across anomalies can diversify away anomaly-specific noise, increasing the resulting measure's ability to identify relative mispricing among stocks. In each country, we form the spread between the top and bottom quintiles of the mispricing measure. The monthly alpha for this mispricing spread has a cross-country average of 118 bps with a t-statistic of 16.2. The individual-country alphas range from 47 to 169 bps, with t-statistics from 3.9 to 17.0. Even after the above data-mining control, the average alpha is 97 bps with a t-statistic of 13.8, and the country alphas range from 40 to 148 bps, with t-statistics from 3.3 to 12.4.

The anomalies in these countries are also consistent with mispricing. In particular, idiosyncratic volatility (IVOL) plays a role similar to what Stambaugh, Yu, and Yuan (2015) observe in the U.S. That study finds the previously observed negative relation between IVOL and alpha is confined to stocks classified as overpriced based on the mispricing measure combining anomaly rankings. As those authors explain, IVOL reflects risk for price-correcting arbitrageurs. That arbitrage risk interacts with what the authors term "arbitrage asymmetry," meaning less capital is available to bear arbitrage risk when shorting overpriced stocks, as compared to the capital bearing arbitrage risk when buying underpriced stocks. As a result, one expects IVOL to deter price correction more among overpriced stocks. Least likely to be corrected is overpricing among high-IVOL stocks, so IVOL should exhibit a negative relation to alpha among overpriced stocks.

In each of the five non-U.S. countries, IVOL exhibits a strongly significant negative relation to alpha among the stocks identified as the most overpriced by the mispricing measure discussed above. These negative IVOL effects, as in the U.S., are consistent with arbitrage risk deterring the correction of overpricing. In contrast, IVOL exhibits little or no relation to alpha among the stocks at the opposite end of the mispricing scale, consistent with arbitrage-asymmetry.

A number of previous studies find that some of the anomalies we examine appear in non-U.S. countries. Examples include Pincus, Rajgopal, and Venkatachalam (2007), McLean, Pontiff, and Watanabe (2009), Chui, Titman, and Wei (2010), Titman, Wei, and Xie (2010), Asness, Moskowitz, and Pedersen (2013), Watanabe, Xu, Yao, and Yu (2013), and Sun, Wei and Xie (2014). Our study uses a larger pre-specified set of anomalies, with longer and broader samples for the five developed stock markets we examine. Jacobs (2016) analyzes the

Stambaugh, Yu, and Yuan (2015) mispricing measure in other countries, but in addition to having a shorter sample period, the study does not examine individual anomalies separately in each country. None of these studies include a data-mining hurdle that assumes the true U.S. alphas are zero, and none examine the interaction between the IVOL effect and an anomaly-based proxy for mispricing.

2. Anomalies and returns

Of the eleven U.S. anomalies used by Stambaugh, Yu, and Yuan (2012, 2014, 2015), we are able to investigate nine of them in each of Canada, France, Germany, Japan, and the U.K.:

1. Net stock issuance (Ritter (1991); Loughran and Ritter (1995))
2. Composite equity issuance (Daniel and Titman (2006))
3. Accruals (Sloan (1996))
4. Net operating assets (Hirshleifer, Hou, Teoh, and Zhang (2004))
5. Asset growth (Cooper, Gulen, and Schill (2008))
6. Investment to assets (Titman, Wei, and Xie (2004); Xing (2008))
7. Momentum (Jegadeesh and Titman (1993); Carhart (1997))
8. Gross Profitability (Novy-Marx (2013))
9. Return on Assets (Fama and French (2006); Wang and Yu (2010))

The other two anomalies, the O-measure of Ohlson (1980) and the financial distress measure of Campbell, Hilscher, and Szilagyi (2008), require estimation of models using data beyond what is available across the five countries for sufficient numbers of stocks and time periods.

Table 1 reports properties of the nine anomalies in each of the five countries. We examine an anomaly's performance in a given country only during months when there are at least ten stocks in each quintile of the anomaly's ranking. Panel A reports the earliest month for which that condition is satisfied. For most anomalies in most countries, our samples begin in the early 1980s, but others do not begin until later that decade. Panel B reports the time-series average of the cross-sectional median of an anomaly's ranking variable, and Panel C reports the average of the ranking variable's cross-sectional standard deviation.

At the end of each month, in each country, we sort stocks based on the most recently available value of a given anomaly's ranking variable. We then form the monthly long-short return spread between the portfolios of stocks in the top and bottom quintiles. Designating

which of those quintiles is the long leg versus the short leg follows the same ordering that produces a positive alpha in the U.S. In each country, we also compute three return factors—market, size, and value (book-to-market)—applying the same procedure outlined by Fama and French (1993) in computing their MKT, SMB, and HML factors. Our calculation of the anomaly variables also follows previous literature. Appendix A gives details of data sources and methods used in constructing the anomaly variables and the portfolio returns.

We examine both equally weighted and value-weighted portfolios. Although our results are robust to either specification, equally weighted portfolios are generally likely to offer more precise inferences in this setting. The issue is essentially the number of available stocks and the length of the sample period. As noted above, we require at least ten stocks per quintile portfolio. Among each country's anomalies satisfying that threshold each month, Panel A of Figure 1 plots the average number of stocks per portfolio, and Panel B plots the smallest number of stocks in any portfolio. We see that despite forming portfolios based on quintiles (versus deciles, often used in the U.S.), the number of stocks in a portfolio is often fairly modest. As a result, the greater diversification achieved with equal weights yields substantially lower portfolio return volatility than value weights produce. Table 2 reports the standard deviation of each anomaly's monthly long-short return in each country. When averaged across anomalies and the five countries, the standard deviation of monthly return is 3.36% for equally weighted portfolios, and 5.24% for value-weighted portfolios. The corresponding quantities are 2.52% and 3.11% in the U.S., where there are generally more stocks. Although both equally weighted and value-weighted portfolios in the five countries have substantially higher standard deviations than those in the U.S., the value-weighted portfolios are especially volatile. Given that the sample periods for these countries are at least two decades shorter than in the U.S., the relatively low standard deviation of equally weighted portfolios is preferred in this situation. Therefore, our discussion below focuses on the results with equally weighted portfolios. Corresponding results for value-weighted portfolios are reported in Appendix B.

Table 3 reports estimated three-factor monthly alphas for each anomaly's long-short spread. The alphas are computed with respect to each country's market, size, and value factors, but the results are robust to using just a market factor or no factor (as reported in the Internet Appendix.) Alphas are reported for the individual countries as well as for the average across countries, with the latter computed by averaging the anomaly's abnormal returns across countries.

For all nine anomalies, the cross-country average alphas are consistently positive and significant. As reported in Table 3, for asset growth, which is weaker than the others, the cross-country average alpha is 13 bps per month with a t-statistic of 1.72. The cross-country average alphas for the other eight anomalies have a mean of 57 bps; the eight t-statistics are all above 3.00 and have a mean of 5.80.

The cross-country average alphas diversify away country-specific noise for a given anomaly. In contrast, the alphas for the composite mispricing measure, also reported in Table 3, diversify away anomaly-specific noise within a given country. The mispricing-measure alphas for the five countries all have substantial economic and statistical significance: For Japan, the monthly alpha is 47 bps with a t-statistic of 3.89. The alphas for the other four countries all exceed 100 bps, with t-statistics all exceeding 7.00. Averaging the mispricing-measure alphas across countries diversifies away both country-specific and anomaly-specific noise. The resulting overall monthly alpha is especially strong: 118 bps with a t-statistic of 16.21.

3. Allowing for U.S. data mining

The results in Table 3 strongly support an inference that most of the anomalies in the pre-specified set from the U.S. also exist in the other five countries. At the same time, these results are not necessarily immune from a concern that the discoveries of these anomalies in the U.S. reflect data mining. Suppose an anomaly's true alpha is zero everywhere but its realized abnormal returns are correlated between the U.S. and another country. Then if the in-sample U.S. alpha is positive, one expects a positive estimated alpha in the other country for the same sample period.

We conduct a test addressing the above issue. Specifically, for each anomaly i in the non-U.S. country j, we estimate the regression

$$R_{i,t}^{(j)} \;=\; \delta_i^{(j)} \;+\; \beta_i^{(j)} f_t^{(j)} \;+\; \phi_i^{(j)} r_{i,t}^{(US)} \;+\; u_{i,t}^{(j)}, \tag{1}$$

where, in month t, $R_{i,t}^{(j)}$ is the anomaly's long-short return spread, $f_t^{(j)}$ is the vector containing country j's factor realizations, and $r_{i,t}^{US}$ is the sample abnormal return in the U.S. This last quantity is the sum of the estimated intercept and the residual in the regression,

$$R_{i,t}^{(US)} \;=\; \alpha_i^{(US)} \;+\; \beta_i^{(US)} f_t^{(US)} \;+\; \epsilon_{i,t}^{(US)}, \tag{2}$$

where $R_{i,t}^{(US)}$ is the anomaly's long-short return spread in the U.S., and $f_t^{(US)}$ contains the

realizations of the U.S. factors. In other words,

$$r_{i,t}^{(US)} = \hat{\alpha}_i^{(US)} + \hat{\epsilon}_{i,t}^{(US)}, \tag{3}$$

where a hat (ˆ) denotes the in-sample least-squares estimate. Under the reasonable (empirically supported) assumption that the estimated U.S. abnormal return, $r_{i,t}^{(US)}$, is uncorrelated with the non-U.S. factors (the elements of $f_t^{(j)}$), omitting $r_{i,t}^{(US)}$ from equation (1) does not affect $\beta_i^{(j)}$. It then follows that

$$\begin{aligned} \delta_i^{(j)} &= \underbrace{\mathrm{E}\{R_{i,t}^{(j)}\} - \beta_i^{(j)}\mathrm{E}\{f_t^{(j)}\}}_{\alpha_i^{(j)}} - \phi_i^{(j)} \underbrace{\mathrm{E}\{r_{i,t}^{(US)}\}}_{\alpha_i^{(US)}} \\ &= \alpha_i^{(j)} - \phi_i^{(j)}\alpha_i^{(US)}, \end{aligned} \tag{4}$$

where $\alpha_i^{(j)}$ is the anomaly's alpha in country j, i.e, the intercept in equation (2) defined for country j instead of the U.S. For the purpose of the test, we assume

$$\alpha_i^{(US)} = 0, \tag{5}$$

consistent with data mining being the sole reason for the significantly positive value of $\hat{\alpha}_i^{(US)}$. With that assumption, we see from equation (4) that $\alpha_i^{(j)} = \delta_i^{(j)}$, so the estimate of $\alpha_i^{(j)}$ under that assumption is simply the estimate of $\delta_i^{(j)}$ from the regression in (1),

$$\tilde{\alpha}_i^{(j)} = \hat{\delta}_i^{(j)} \tag{6}$$

$$= \underbrace{\bar{R}_i^{(j)} - \hat{\beta}_i^{(j)}\bar{f}^{(j)}}_{\approx\ \hat{\alpha}_i^{(j)}} - \hat{\phi}_i^{(j)} \underbrace{\bar{r}_i^{(US)}}_{\hat{\alpha}_i^{(US)}} \tag{7}$$

$$\approx \hat{\alpha}_i^{(j)} - \hat{\phi}_i^{(j)}\hat{\alpha}_i^{(US)}, \tag{8}$$

where a bar (¯) in equation (7) denotes the sample average of the quantity. We see from the relation in (8) that if $\hat{\phi}_i^{(j)} > 0$, i.e., if the cross-country correlation of abnormal returns is positive, then the usual estimate of country j's alpha, $\hat{\alpha}_i^{(j)}$, is reduced by $\hat{\phi}_i^{(j)}$ times the (positive) U.S. alpha estimated over the same sample period. The approximation in (8) reflects the minor difference between the sample estimates of $\beta_i^{(j)}$ obtained with and without $r_{i,t}^{(US)}$ included in equation (1). A significantly positive $\tilde{\alpha}_i^{(j)}$ supports an inference that the anomaly's true alpha in the non-U.S. country is positive even if the anomaly's significance in the U.S. market is just a result of data mining.

The above control for data mining is strong, in that equation (5) allows no true presence of the anomaly in the U.S. If the true U.S. alpha is instead positive, then requiring significance of $\tilde{\alpha}_i^{(j)}$ instead of $\hat{\alpha}_i^{(j)}$ becomes overly conservative, too often failing to detect a true anomaly

in country j. Nevertheless, most of the anomalies also clear this high hurdle in each of the five countries.

Table 4 reports estimates of $\tilde{\alpha}_i^{(j)}$, presented in the same format as the estimates of $\hat{\alpha}_i^{(j)}$ in Table 3. The cross-country average alphas of all nine anomalies have the same sign as the U.S. counterparts, although two of the nine anomalies become insignificant. The anomaly that exhibits marginal significance in Table 3, asset-growth, becomes insignificant in Table 4. The average $\tilde{\alpha}_i^{(j)}$ drops to 11 bps per month, compared to 13 bps for $\hat{\alpha}_i^{(j)}$ in Table 3, with the t-statistic dropping from 1.72 to 1.41. Of the other eight anomalies, the only one that loses overall cross-country significance in Table 4 is return-on-assets, whose average $\tilde{\alpha}_i^{(j)}$ drops to 5 bps per month, compared to 28 bps for $\hat{\alpha}_i^{(j)}$ in Table 3, with the t-statistic dropping from 3.15 to 0.55.

In contrast to return-on-assets, the other seven anomalies that are significant in Table 3 remain quite significant in Table 4. The cross-country average alphas range from 16 to 83 bps, with t-statistics from 2.33 to 7.81. Of the 35 individual-country alphas for those seven anomalies, only two are negative (but insignificant), and 23 have t-statistics of at least 2.00. A majority of these anomalies also experience a drop in alpha when going from Table 3 to Table 4, but the drop does not change the overall conclusion. In general, except for return-on-assets, conditioning on assumed U.S. data mining appears to have a fairly modest influence on inferences about the anomalies in the five non-U.S. countries.

The mispricing measure described earlier, which averages the anomaly percentiles across all nine anomalies, including asset-growth and return-on-assets, still produces a large and significant alpha in each country, ranging from 29 to 134 bps, with t-statistics from 2.31 to 10.50. The cross-country average alpha for this composite strategy is 81 bps with a t-statistic of 12.02, slightly weaker than in Table 3 but still very significant both economically and statistically.

In sum, the data-mining issue does little to weaken an inference that the pre-specified set of prominent U.S. anomalies also produces strong abnormal returns in Canada, France, Germany, Japan, and the U.K.

4. Idiosyncratic volatility and mispricing

One interpretation of anomalies is that they represent mispricing. A key question confronting that interpretation is why mispricing would survive the forces of arbitrage seeking

to exploit it. Stambaugh, Yu, and Yuan (2015) advance one explanation that combines two familiar concepts in the literature, arbitrage risk and arbitrage asymmetry. In that study, idiosyncratic volatility (IVOL) represents arbitrage risk, i.e., risk that deters arbitrage and its accompanying price correction. Arbitrage asymmetry is a greater ability or willingness of investors to take long positions as compared to short positions. With arbitrage asymmetry, there is less capital in the market sharing the risk in shorting overpriced stocks than the capital sharing the risk in buying underpriced stocks. As a result, price correction is deterred by arbitrage risk (IVOL) more among overpriced stocks than among underpriced stocks. We investigate the two main empirical implications of this argument.

The first empirical implication is that, among overpriced stocks, there should be a negative relation between IVOL and alpha. Among the most relatively overpriced stocks in a given country, the stocks with the highest IVOL should be those with the least price correction and thus the largest negative alphas. In other words, the alpha for the high-low IVOL spread, which we term the "IVOL effect," should be negative among stocks having the highest values of the mispricing measure, representing the most overpriced stocks.

The second implication is that the IVOL effect should be decreasing in the mispricing measure. For lower values of the mispricing measure, overpricing is less likely, and thus the likelihood that IVOL deters the correction of overpricing is less likely.

We compute each stock's IVOL as the standard deviation of the daily abnormal return with respect to the country's three-factor model, following common practice in U.S. data. We then perform a two-way sort of stocks within each country, independently sorting on the mispricing measure and IVOL, assigning stocks to the top, middle, or bottom third of each variable. Assigning stocks to just 9 cells, instead of the 25 used by Stambaugh, Yu, and Yuan (2015) in their 5×5 sort of U.S. stocks, is a concession to the smaller universes generally available in the five non-U.S. countries.[2] Table 5 reports, for each country, the alphas on equally weighted portfolios constructed for each of the nine cells in the two-way sort on IVOL and the mispricing measure. Also reported for each mispricing category is the IVOL effect (i.e., the alpha for the spread between the highest and lowest IVOL portfolios).

Consistent with the first implication above, the IVOL effect is significantly negative in each of the five countries among the most overpriced stocks. The IVOL effect in that case ranges from -44 to -92 bps, with t-statistics from -2.35 to -3.56. The cross-country

[2]The Internet Appendix provides the sample period in each country for which we can conduct this analysis, the average IVOL within each of the resulting categories, and the average number of stocks in each cell for each country.

average of the IVOL effect among the most overpriced stocks is −73 bps, with a t-statistic of −5.49.

The second implication, a negative relation between the IVOL effect and the mispricing measure, is also supported. Table 5 reports each country's difference in IVOL effects between the highest versus lowest mispricing measures. The difference is negative in each country, as predicted, with t-statistics between −1.21 and −3.11. The cross-country average of this difference is −49 bps with a t-statistic of −4.43.

The estimated IVOL effects among stocks with the lowest mispricing measures, although generally insignificant (with t-statistics from −0.08 to −1.89) are nevertheless negative in each country. This pattern is consistent enough that, when averaged across the five countries, the IVOL effect among these stocks becomes marginally significantly negative, having an alpha difference of −24 bps with a t-statistic of −1.88. This result differs from that of Stambaugh, Yu, and Yuan (2015), who find a positive IVOL effect among stocks with the lowest values of the mispricing measure. As noted above, those authors use a 5 × 5 sort instead of our 3 × 3 sort. They characterize stocks in the lowest fifth of the mispricing measure as underpriced, and they explain that the IVOL effect among underpriced stocks should be positive, not negative. For convenience, we label the bottom third of the mispricing measure in Table 5 as "underpriced," but such a characterization becomes more tenuous for stocks in the bottom third as opposed to the bottom fifth. Arbitrage asymmetry also implies that overpricing should be more prevalent in general than underpricing. If the lowest third still contains some stocks that are overpriced to some degree, the sign of the IVOL effect among that segment becomes ambiguous. Thus, the cleaner implication on which we focus is simply that the IVOL effect should be negatively related to the mispricing measure.

We also explore the sensitivity of our results to using a mispricing measure that includes two other strong anomalies in the five countries we examine. To do so we replace return-on-assets with return-on-equity (ROE), a related measure of profitability, and we add book-to-market (BM). Both ROE and BM have many significant alphas in the five countries, and their cross-country average alphas both exhibit strong significance, with and without the data-mining control in the previous section. Table 6 reports the alphas for ROE, BM, and the resulting ten-anomaly mispricing measure. This alternative measure, however, produces IVOL effects very similar to those reported in Table 5. The results are provided in the Internet Appendix.

5. Conclusions

A pre-specified set of nine prominent U.S. equity return anomalies produce significant alphas in Canada, France, Germany, Japan, and the U.K. The anomalies largely remain quite significant even in a test that assumes the true alphas on the anomalies equal zero in the U.S. That assumption is motivated by a data-mining concern, which our results thus serve to lessen. Under the assumption of a zero U.S. alpha for an anomaly, the test of the anomaly's significance in the non-U.S. country simply includes the anomaly's U.S. abnormal return as an additional right-hand variable in the usual factor-model regression.

As found previously in the U.S. by Stambaugh, Yu, and Yuan (2015), each of the five countries examined here exhibits a strong negative alpha-IVOL relation among overpriced stocks. Those stocks in each country are identified using a composite measure that combines anomaly rankings, following Stambaugh, Yu, and Yuan (2015). As those authors explain, this result is consistent with idiosyncratic volatility being a greater deterrent to price-correcting arbitrage among overpriced stocks, as that arbitrage risk is shared by the lower amount of capital available for shorting stocks, compared to buying them. These IVOL effects, now documented in five additional countries, support a view that the anomalies, rather than being spurious, at least in part reflect mispricing.

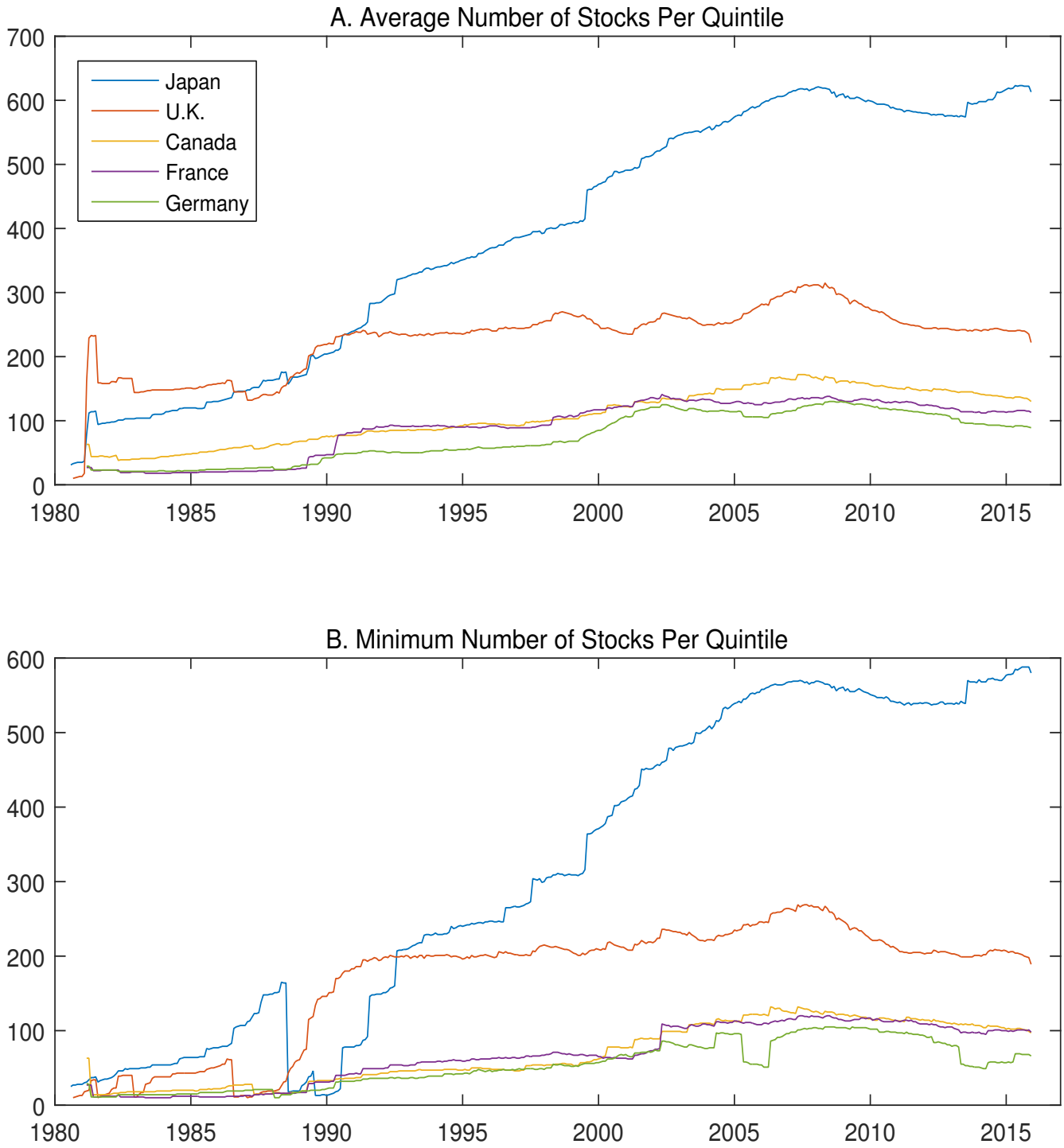

Figure 1. Time series of the number of stocks per quintile in each country. Panel A displays, for the anomalies used at each date, the average number of stocks per quintile (i.e., per portfolio). Panel B displays the minimum, across the anomalies, of the number of stocks per quintile.

Table 1
Anomaly Variables' Starting Months, Median Values, and Standard Deviations

The table reports, for each country and anomaly, the starting month of data (Panel A) and the time-series averages of each ranking variable's cross-sectional median (Panel B) and standard deviation (Panel C). Also shown in Panel A are the starting dates for the composite mispricing measure that averages a stock's ranking percentiles across anomalies.

Anomaly	Canada	France	Germany	Japan	U.K.
A. Starting month					
Net stock issues	4/1981	6/1990	2/1989	4/1981	4/1981
Composite equity issues	4/1981	4/1981	4/1981	4/1981	4/1981
Total accruals	5/1988	5/1989	5/1989	8/1989	2/1987
Net operating assets	5/1987	5/1988	5/1988	8/1988	8/1986
Asset growth	5/1982	6/1982	5/1982	8/1981	8/1981
Investment/assets	5/1982	6/1982	5/1989	8/1981	8/1981
Momentum	3/1981	3/1981	3/1981	3/1981	3/1981
Gross profitability	5/1981	5/1983	2/1988	8/1980	12/1982
Return on assets	5/1981	6/1981	5/1981	8/1980	9/1980
Mispricing measure (composite)	4/1981	6/1981	5/1981	3/1981	4/1981
B. Cross-sectional median (averaged over the sample period)					
Net stock issues	0.01	0.00	0.00	0.00	0.00
Composite equity issues	-0.03	-0.03	-0.03	-0.05	-0.02
Total accruals	-0.05	-0.04	-0.05	-0.02	-0.03
Net operating assets	0.76	0.53	0.50	0.54	0.62
Asset growth	0.09	0.08	0.06	0.07	0.08
Investment/assets	0.08	0.04	0.04	0.05	0.05
Momentum	0.02	0.06	0.03	0.04	0.04
Gross profitability	0.18	0.14	0.29	0.24	0.30
Return on assets	0.04	0.04	0.03	0.03	0.06
C. Cross-sectional standard deviation (averaged over the sample period)					
Net stock issues	0.39	0.37	0.49	0.26	0.38
Composite equity issues	0.44	0.20	0.22	0.14	0.29
Total accruals	0.09	0.09	0.12	0.05	0.11
Net operating assets	0.54	0.34	0.42	0.18	0.48
Asset growth	0.68	0.48	0.52	0.23	0.67
Investment/assets	0.30	0.14	0.18	0.09	0.19
Momentum	0.77	0.45	0.48	0.39	0.53
Gross profitability	0.17	0.16	0.21	0.16	0.22
Return on assets	0.13	0.07	0.10	0.03	0.16

Table 2
Anomaly Long-Short Return Volatilities

The table reports the standard deviation (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. In Panel A, the long- and short-leg portfolios are equally weighted, whereas in Panel B they are value weighted. Volatilities are shown for each individual anomaly as well as the composite mispricing measure that averages a stock's ranking percentiles across anomalies. The "average" column reports the volatility of an equally weighted cross-country combination of the long-short spreads. The "average" row contains the average of the values in the preceding rows. Also reported in the last column, for comparison, are U.S. volatilities.

Anomaly	Canada	France	Germany	Japan	U.K.	Average	U.S.
A. Equally weighted portfolios							
Net stock issues	3.72	3.12	2.99	2.58	2.57	3.03	2.63
Composite equity issues	4.03	3.97	4.56	4.45	2.78	4.02	3.49
Total accruals	3.65	2.15	2.78	1.46	1.90	2.51	1.41
Net operating assets	3.70	2.28	2.91	1.67	2.30	2.67	2.06
Asset growth	3.45	3.56	4.24	2.86	2.22	3.33	2.04
Investment/assets	3.67	3.00	3.18	2.48	1.99	2.90	1.96
Momentum	5.64	4.99	5.31	4.95	4.06	5.05	4.31
Gross profitability	3.76	2.97	2.63	3.57	2.26	3.12	2.38
Return on assets	4.54	3.60	3.69	3.27	2.94	3.65	2.41
Average	4.02	3.29	3.59	3.03	2.56	3.36	2.52
Mispricing measure (composite)	3.64	2.83	3.34	2.39	2.17	2.95	2.63
B. Value-weighted portfolios							
Net stock issues	4.65	4.28	5.55	4.44	3.88	4.56	2.48
Composite equity issues	7.50	5.95	6.66	5.87	5.04	6.26	3.41
Total accruals	6.22	4.94	4.85	3.11	4.51	4.84	2.57
Net operating assets	5.15	3.96	4.72	2.83	3.25	4.07	2.11
Asset growth	4.98	4.99	4.93	4.03	3.72	4.56	3.01
Investment/assets	5.04	5.13	4.37	4.45	3.33	4.51	2.67
Momentum	9.00	6.67	8.31	6.82	7.37	7.70	5.42
Gross profitability	6.36	3.95	4.60	4.96	4.49	4.97	2.89
Return on assets	7.14	5.76	5.62	4.98	4.74	5.70	3.43
Average	6.23	5.07	5.51	4.61	4.48	5.24	3.11
Mispricing measure (composite)	4.42	4.52	4.62	4.15	4.00	4.35	3.25

Table 3
Alphas for Anomaly Long-Short Returns

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. Alpha is the estimated intercept in a regression of the spread return on the country's market, size, and book-to-market factors. The long- and short-leg portfolios are equally weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alphas, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.39	0.33	0.36	0.50	0.81	0.50
Composite equity issues	1.07	0.71	0.39	0.28	0.82	0.64
Total accruals	0.28	0.38	0.24	0.19	0.50	0.29
Net operating assets	0.52	0.50	0.44	0.08	0.60	0.39
Asset growth	0.35	-0.02	0.11	-0.05	0.34	0.13
Investment/assets	0.38	0.33	0.29	0.05	0.61	0.35
Momentum	1.88	1.65	1.46	0.35	2.08	1.51
Gross profitability	0.67	0.39	0.67	0.38	0.78	0.61
Return on assets	-0.14	0.42	0.17	0.19	0.78	0.28
Mispricing measure (composite)	1.37	1.27	1.11	0.47	1.69	1.18
B. t-statistics						
Net stock issues	2.59	2.00	2.21	3.97	7.47	7.20
Composite equity issues	5.91	4.27	1.91	1.43	6.67	5.80
Total accruals	1.40	3.12	1.62	2.26	5.03	3.60
Net operating assets	2.59	4.17	3.10	0.94	5.15	4.79
Asset growth	2.19	-0.11	0.59	-0.40	3.48	1.72
Investment/assets	2.25	2.38	1.88	0.41	6.64	4.77
Momentum	7.04	7.06	5.72	1.47	11.85	9.50
Gross profitability	4.12	2.93	4.64	2.20	7.84	7.58
Return on assets	-0.68	2.55	1.03	1.16	6.06	3.15
Mispricing measure (composite)	8.39	9.12	7.62	3.89	17.01	16.21

Table 4
Alphas for Anomaly Long-Short Returns Conditional on U.S. Alphas Equal to Zero

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. An anomaly's alpha in each of the five countries is estimated under the assumption that the anomaly's true alpha in the U.S. equals zero. Under that assumption, alpha is the estimated intercept in a regression of the spread return on the country's market, size, and book-to-market factors as well as the U.S. anomaly's abnormal return. The long- and short-leg portfolios are equally weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alphas, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.17	0.07	0.34	0.43	0.63	0.35
Composite equity issues	1.25	0.90	0.65	0.30	0.86	0.77
Total accruals	0.08	0.35	0.20	0.20	0.45	0.23
Net operating assets	0.10	0.40	0.41	0.09	0.44	0.25
Asset growth	0.11	-0.01	0.22	-0.03	0.33	0.11
Investment/assets	-0.01	0.13	0.17	-0.02	0.50	0.16
Momentum	1.08	0.72	0.88	0.02	1.40	0.83
Gross profitability	0.64	0.41	0.67	0.42	0.83	0.62
Return on assets	-0.57	0.13	-0.06	0.23	0.56	0.05
Mispricing measure (composite)	0.97	0.59	0.86	0.29	1.34	0.81
B. t-statistics						
Net stock issues	1.09	0.41	2.01	3.18	5.31	5.14
Composite equity issues	6.08	5.07	2.98	1.50	6.04	7.11
Total accruals	0.45	2.91	1.40	2.39	4.69	2.86
Net operating assets	0.55	3.10	2.78	1.00	3.73	3.15
Asset growth	0.71	-0.04	1.31	-0.22	3.21	1.41
Investment/assets	-0.08	0.93	0.99	-0.18	4.93	2.33
Momentum	4.30	3.40	3.16	0.06	7.69	6.80
Gross profitability	3.79	3.11	4.65	2.46	8.27	7.81
Return on assets	-2.40	0.63	-0.29	1.41	3.73	0.55
Mispricing measure (composite)	4.53	4.20	4.52	2.31	10.50	12.02

Table 5

Alphas for Portfolios Sorted on IVOL and the Mispricing Measure

The table reports, for each country, the alpha on each of the nine equally weighted portfolios formed by an independent 3 × 3 sort on IVOL and the composite mispricing measure that averages a stock's ranking percentiles across anomalies. All t-statistics (in parentheses) are based on the heteroskedasticity-consistent standard errors of White (1980).

Mispricing category	IVOL category			
	Low	Middle	High	High−Low
	A.Cross-Country Average			
Underpriced	0.54	0.60	0.30	-0.24
	(9.09)	(10.06)	(2.52)	(-1.88)
Middle	0.13	0.13	-0.15	-0.28
	(2.51)	(2.45)	(-1.36)	(-2.25)
Overpriced	-0.07	-0.26	-0.80	-0.73
	(-1.23)	(-4.10)	(-6.73)	(-5.49)
Over-Under	-0.61	-0.85	-1.09	-0.49
	(-9.41)	(-11.43)	(-9.76)	(-4.43)
All stocks	0.20	0.16	-0.25	-0.45
	(4.37)	(3.59)	(-2.47)	(-3.89)
	B. Canada			
Underpriced	0.73	0.86	0.52	-0.21
	(6.63)	(5.62)	(2.01)	(-0.80)
Middle	0.10	0.26	0.01	-0.09
	(1.03)	(1.76)	(0.02)	(-0.30)
Overpriced	-0.12	-0.36	-0.79	-0.67
	(-1.03)	(-2.31)	(-2.84)	(-2.35)
Over-Under	-0.85	-1.22	-1.31	-0.46
	(-6.39)	(-6.46)	(-4.78)	(-1.61)
All stocks	0.24	0.25	-0.17	-0.40
	(3.05)	(2.20)	(-0.72)	(-1.71)
	C. France			
Underpriced	0.51	0.70	0.38	-0.12
	(4.52)	(7.02)	(2.10)	(-0.57)
Middle	0.15	0.00	-0.19	-0.34
	(1.42)	(0.03)	(-1.20)	(-1.66)
Overpriced	-0.10	-0.41	-0.90	-0.79
	(-0.93)	(-3.80)	(-4.78)	(-3.56)
Over-Under	-0.61	-1.11	-1.28	-0.67
	(-4.58)	(-7.59)	(-6.50)	(-2.99)
All stocks	0.19	0.11	-0.25	-0.44
	(2.37)	(1.65)	(-1.69)	(-2.43)

Table 5 (continued)

Mispricing category	IVOL category			
	Low	Middle	High	High−Low
		D. Germany		
Underpriced	0.58	0.67	0.33	-0.24
	(5.99)	(5.75)	(1.46)	(-0.99)
Middle	0.15	0.21	-0.16	-0.30
	(1.46)	(1.52)	(-0.69)	(-1.16)
Overpriced	-0.06	-0.29	-0.98	-0.92
	(-0.58)	(-1.76)	(-3.55)	(-3.26)
Over-Under	-0.64	-0.96	-1.31	-0.68
	(-4.57)	(-5.21)	(-5.38)	(-2.58)
All stocks	0.22	0.19	-0.26	-0.48
	(3.29)	(1.94)	(-1.26)	(-2.14)
		E. Japan		
Underpriced	0.23	0.37	-0.06	-0.29
	(2.54)	(4.93)	(-0.47)	(-1.89)
Middle	0.07	0.20	-0.15	-0.22
	(0.94)	(3.85)	(-1.60)	(-1.66)
Overpriced	-0.03	0.00	-0.47	-0.44
	(-0.41)	(-0.05)	(-4.12)	(-3.05)
Over-Under	-0.26	-0.37	-0.41	-0.15
	(-2.50)	(-3.31)	(-3.07)	(-1.21)
All stocks	0.08	0.19	-0.23	-0.30
	(1.19)	(4.86)	(-2.29)	(-2.27)
		F. United Kingdom		
Underpriced	0.63	0.55	0.62	-0.02
	(5.73)	(5.44)	(3.13)	(-0.08)
Middle	0.24	0.07	-0.18	-0.42
	(2.51)	(0.69)	(-1.09)	(-2.42)
Overpriced	-0.09	-0.20	-0.83	-0.74
	(-0.78)	(-1.90)	(-4.36)	(-3.32)
Over-Under	-0.72	-0.76	-1.44	-0.72
	(-5.73)	(-6.22)	(-7.00)	(-3.11)
All stocks	0.27	0.15	-0.20	-0.47
	(3.20)	(1.86)	(-1.34)	(-2.89)

Table 6
Alphas for Book to Market, Return on Equity, and the Revised Mispricing Measure

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of return on equity, book to market, and a revised mispricing measure that combines those two anomalies with the first eight in Tables 1 through 4. Panel A reports the alpha estimated as the intercept in a regression of the spread return on the country's market, size, and book-to-market factors. Panel B reports the alpha estimated under the assumption that the anomaly's true alpha in the U.S. equals zero. Under that assumption, alpha is the estimated intercept in a regression of the spread return on the country's market, size, and book-to-market factors as well as the U.S. anomaly's abnormal return. The long- and short-leg portfolios are equally weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. All t-statistics (in parentheses) are based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Unconditional alpha estimates						
Book to Market	0.31	0.62	0.26	0.31	0.47	0.38
	(1.92)	(4.36)	(2.00)	(3.00)	(4.12)	(5.27)
Return on Equity	-0.07	0.57	0.52	0.18	0.76	0.35
	(-0.30)	(4.10)	(2.87)	(1.92)	(5.62)	(4.01)
Mispricing Measure (revised)	1.34	1.28	1.12	0.54	1.63	1.18
	(8.03)	(9.85)	(7.69)	(4.54)	(16.77)	(17.15)
B. Alpha estimates conditional on U.S. alphas equal to zero						
Book to Market	0.13	0.43	0.14	0.28	0.26	0.24
	(0.72)	(2.88)	(1.08)	(2.73)	(2.20)	(3.41)
Return on Equity	-0.20	0.53	0.48	0.17	0.73	0.30
	(-0.93)	(3.73)	(2.68)	(1.84)	(5.41)	(3.56)
Mispricing measure (revised)	0.96	0.78	0.89	0.44	1.29	0.87
	(4.59)	(5.51)	(5.31)	(3.54)	(10.72)	(13.52)

References

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2006, The cross-section of volatility and expected returns, *The Journal of Finance* 61, 259–299.

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2009, High idiosyncratic volatility and low returns: International and further US evidence, *Journal of Financial Economics* 91, 1–23.

Asness, Clifford S., Tobias J. Moskowitz, and Lasse H. Pedersen, 2013, Value and momentum everywhere, *Journal of Finance* 68, 929–985.

Campbell, John Y., Jens Hilscher, and Jan Szilagyi, 2008, In search of distress risk, *Journal of Finance* 63, 2899–2939.

Carhart, Mark M., 1997, On persistence in mutual fund performance, *Journal of Finance* 52, 57–82.

Chui, Andy CW, Sheridan Titman, and KC John Wei, 2010, Individualism and momentum around the world, *Journal of Finance* 65, 361–392.

Cooper, Michael J., Huseyin Gulen, and Michael J. Schill, 2008, Asset growth and the cross-section of stock returns, *Journal of Finance* 63, 1609–1652.

Daniel, Kent D., and Sheridan Titman, 2006, Market reactions to tangible and intangible information, *Journal of Finance* 61, 1605–1643.

Davis, James L., Eugene F. Fama, and Kenneth R. French, 2000, Characteristics, covariances, and average returns: 1929 to 1997, *Journal of Finance* 55, 389–406.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3–56.

Fama, Eugene F., and Kenneth R. French, 1998, Value versus growth: the international evidence, *Journal of Finance* 53, 1975–1999.

Fama, Eugene F., and Kenneth R. French, 2006, Profitability, investment, and average returns, *Journal of Financial Economics* 82, 491–518.

Fama, Eugene F., and Kenneth R. French, 2012, Size, value, and momentum in international stock returns, *Journal of Financial Economics* 105, 457–472.

Griffin, John M., Patrick J. Kelly, and Federico Nardari, 2010, Do market efficiency measures yield correct inferences? A comparison of developed and emerging markets, *Review of Financial Studies* 23, 3225–3277.

Harvey, Campbell R., Yan Liu, Heqing Zhu, 2016, ... and the cross-section of expected returns, *Review of Financial Studies* 29, 5–68.

Hirshleifer, David, Kewei Hou, Siew Hong Teoh, and Yinglei Zhang, 2004, Do investors overvalue firms with bloated balance sheets? *Journal of Accounting and Economics* 38, 297–331.

Hou, Kewei, Chen Xue, and Lu Zhang, 2017, Replicating anomalies, Working paper, Ohio State University, University of Cincinnati, and Ohio State University.

Hou, Kewei, Andrew G. Karolyi, and Bong-Chan Kho, 2011, What factors drive global stock returns?, *Review of Financial Studies* 24, 2527–2574.

Ince, Ozgur S., and Burt R. Porter, 2006, Individual equity return data from Thomson Datastream: Handle with care!, *Journal of Financial Research* 29, 463–479.

Jacobs, Heiko, 2016, Market maturity and mispricing, *Journal of Financial Economics* 122, 270–287.

Jegadeesh, Narasimhan, and Sheridan Titman, 1993, Returns to buying winners and selling losers: Implications for market efficiency, *Journal of Finance* 48, 65–91.

Linnainmaa, Juhani T., and Michael R. Roberts, 2016, The history of the cross-section of stock returns, Working paper, University of Southern California and University of Pennsylvania.

Loughran, Tim, and Jay R. Ritter, 1995, The new issues puzzle, *Journal of Finance* 50, 23–51.

McLean, David R., Jeffrey Pontiff, and Akiko Watanabe, 2009, Share issuance and cross-sectional returns: International evidence, *Journal of Financial Economics* 94, 1–17.

Novy-Marx, Robert, 2013, The other side of value: The gross profitability premium, *Journal of Financial Economics* 108, 1–28.

Ohlson, James A., 1980, Financial ratios and the probabilistic prediction of bankruptcy, *Journal of Accounting Research* 18, 109–131.

Pincus, Morton, Shivaram Rajgopal, and Mohan Venkatachalam, 2007, The accrual anomaly: International evidence, *The Accounting Review* 82, 169–203.

Ritter, Jay R., 1991, The long-run performance of initial public offerings, *Journal of Finance* 46, 3–27.

Rosenberg, Barr, Kenneth Reid, and Ronald Lanstein, 1985, Persuasive evidence of market inefficiency, *Journal of Portfolio Management* 11, 9–16.

Rouwenhorst, K. Geert, 1998, International momentum strategies, *Journal of Finance* 53, 267–284.

Sloan, Richard G., 1996, Do stock prices fully reflect information in accruals and cash flows about future earnings? *The Accounting Review* 71, 289–315.

Stambaugh, Robert F., Jianfeng Yu, and Yu Yuan, 2012, The short of it: Investor sentiment and anomalies, *Journal of Financial Economics* 104, 288–302.

Stambaugh, Robert F., Jianfeng Yu, and Yu Yuan, 2014, The long of it: Odds that investor sentiment spuriously predicts anomaly returns, *Journal of Financial Economics* 114, 613–619.

Stambaugh, Robert F., Jianfeng Yu, and Yu Yuan, 2015, Arbitrage asymmetry and the idiosyncratic volatility puzzle, *Journal of Finance* 70, 1903–1948.

Sun, Lei, KC John Wei, and Feixue Xie, 2014, On the explanations for the gross profitability effect: Insights from international equity markets, Working paper.

Titman, Sheridan, KC John Wei, and Feixue Xie, 2004, Capital investments and stock returns, *Journal of Financial and Quantitative Analysis* 39, 677–700.

Titman, Sheridan, KC John Wei, and Feixue Xie, 2010, Access to equity markets, corporate investments and stock returns: International evidence, Working paper.

Wang, Huijun, and Jianfeng Yu, 2010, Dissecting the profitability premium, Working paper, University of Minnesota.

Watanabe, Akiko, Yan Xu, Tong Yao, and Tong Yu, 2013, The asset growth effect: Insights from international equity markets, *Journal of Financial Economics* 108, 529–563.

White, Halbert, 1980, A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity, *Econometrica* 48, 817–838.

Xing, Yuhang, 2008, Interpreting the value effect through the Q-theory: An empirical investigation, *Review of Financial Studies* 21, 1767–1795.

Appendix A. Data Description

This appendix provides details of data sources and methods. Section A1 describes the sources and screening procedures for our data. We apply filters commonly used by previous studies to clean the data and construct the nine individual anomalies in each country. Section A2 describes the construction of the anomaly measures and the corresponding mispricing scores, with the latter following the method in Stambaugh Yu and Yuan (2015) for U.S. anomalies. Section A3 describes the method for constructing each country's three factors (corresponding to those in Fama and French (1993) for U.S. stocks) and the idiosyncratic volatility (IVOL) measure.

A1. Data screening procedures

Our stock price data and accounting data come from Datastream and WorldScope. Our sample contains all firms from January 1980 to December 2015 for five countries: Canada, France, Germany, Japan, and the United Kingdom. We apply filters suggested by Ince and Porter (2003), Karolyi, Hou and Kho (2011), and Griffin, Kelly and Nardari (2010).

Datastream price data

We apply the following filters to Datastream data:

1. Country and Exchanges: We include all stocks traded on the major exchange for Canada (Toronto Stock Exchange), France (Paris Stock Exchange), Germany (Frankfurt Stock Exchange) and the U.K. (London Stock Exchange), and on the two major exchanges for Japan (Tokyo Stock Exchange and JASDAQ). Furthermore, we filter to include only the common stocks (TYP=EQ) and the ones traded at the major exchange(s) for the five countries in local currency. We choose the primary security of each company (IsMajorSec=Y). Each observation must have country, exchange name, DScode, date, price, and a valid market value in the previous month to be included in our sample.

2. Filter non-common equity securities using security names: Restricting TYP=EQ is not adequate to exclude all non-common equity securities. Datastream tracks security type information predominantly through the addition of text in the security's name files. Following Griffin Kelly and Nardari (2010), we apply company name (DSSECNAME) filters to exclude non-common equity firms: We apply both the generic and the country-specific name filters to identify and exclude preferred stock, American Depositary Receipts (ADRs), mutual funds, index funds, warrants, investment trusts, Real Estate Investment Trusts (REITs) and other forms of non-common equity. These filters are listed in Table A1.

3. Filter data errors in returns: We apply several screening procedures for monthly returns as suggested by Ince and Porter (2003) and others. First, any return above 300% that is reversed within one month is set to missing. Specifically, if R_t or R_{t-1} is greater than 300%, and $(1 + R_t)(1 + R_{t-1}) - 1 < 50\%$, then both R_t and R_{t-1} are set to missing. Second, in order to exclude remaining outliers in returns that cannot be identifiable as stock splits or mergers, we treat as missing the monthly returns that fall out of the 0.1% and 99.9% percentile ranges in each country. We also eliminate all monthly observations for delisted stocks from the end of the sample period to the first non-zero return date (based on local currency) since Datastream keeps padding the last available data after the delisting date. We use exchange rate data from Bloomberg to convert all returns into USD-denominated valuers.

4. Filter by market capitalization: We exclude observations for stocks with market value below each country's fifth percentile in the month of portfolio formation. According to Ince and Porter (2003), return related errors are concentrated among small stocks. Following Jacobs (2016), we also exclude observations in which the market capitalization of a stock is larger than 90% of the country's market capitalization.

WorldScope accounting data

Annual financial statement data used in this study come from WorldScope. Each record must contain the country, fiscal year, and a positive value for total assets (AT, WC02999) to be included in our sample. We convert all accounting variables to USD-denominated values using exchange rate data from Bloomberg.

A2. Anomalies and composite mispricing score construction

We first compute anomaly measures at the end of each month. To ensure that the accounting information is available in the portfolio construction month, we require at least a four-month gap between the portfolio formation month and the month of the fiscal year end, if accounting data are used to calculate an anomaly value. In other words, at the portfolio formation month of $t-1$, accounting data with a fiscal year end between $t-5$ and $t-16$ are treated as the most recent information for computing anomaly values. For the asset growth, gross profitability, and investment-to-assets anomalies, we apply a special treatment for outliers, discussed in the calculation of those anomaly measures below. For all other anomalies, we trim at the top and bottom 1% of anomaly values every month to remove outliers.

We then form the monthly quintiles for each anomaly. Designating which of those quintiles is the long leg versus the short leg follows the same ordering that produces a positive alpha in the U.S. The long-short return spread between the portfolios of stocks in the top and bottom quintiles for each anomaly is computed accordingly. For each anomaly (except for net stock issuance), we sort stocks into quintiles every month in each country, and we require at least 10 stocks in each quintile.

Some of the individual anomalies have been examined in the international setting by previous studies, including McLean, Pontiff, and Watanabe (2009) on net stock issues, Pincus, Rajgopal, and Venkatachalam (2007) on total accruals, Watanabe, Xu, Yao, and Yu (2013) and Titman, Wei, Xie (2010) on asset growth, Chui, Titman, and Wei (2010) on momentum, Sun, Wei and Xie (2014) on gross profitability. To avoid any potential data mining concerns, we adhere to the procedures in Stambaugh, Yu and Yuan (2015) to construct the anomaly measures.

Below we detail the construction of the anomaly measures:

Anomaly 1: Net stock issues (NSI) We measure NSI as the log of annual changes in split-adjusted shares outstanding. Specifically, NSI is the cumulative net stock issuance from month $t-13$ to month $t-1$, calculated using shares outstanding and the cumulative adjusted factor (CumAdjFactor) from Datastream monthly data. NSI is computed as:

$$NSI_{t-1} = log\left(\frac{Sharesoutstanding_{t-1} * CumAdjFactor_{t-1}}{sharesoutstanding_{t-13} * CumAdjFactor_{t-13}}\right)$$

To balance the number of stocks in each quintile, we assign stocks with negative NSI to quintile 1 and stocks with NSI equal to 0 to quintile 2. We divide stocks with positive NSI into three groups, and assign an equal number of stocks to quintiles 3, 4, and 5.

Anomaly 2: Composite equity issues (CEI) We compute the CEI measure by subtracting the 12-month cumulative stock return $cumret_{t-1,t-12}$ from the 12-month growth in equity market capitalization. The portfolios are rebalanced every month based on CEI calculated in the past 12 months. CEI is computed as:

$$CEI_{t-1} = \frac{Price_{t-1} * Shares\ outstanding_{t-1}}{Price_{t-13} * Shares\ outstanding_{t-13}} - cumret_{t-1,t-12}$$

Anomaly 3: Total accruals (ACCR) We measure accruals as the annual change in noncash working capital minus depreciation and amortization expense (DP, WC01151), divided by average total assets (AT, WC02999) for the previous two fiscal years. Noncash working capital is computed as the change in current assets (ACT, WC02201) minus the change in cash and short-term investment (CHE, WC02001), minus the change in debt included in current liabilities (LCT, WC03101), plus the change in current liabilities (DLC, WC03051), plus the change in income tax payable (TXP, WC03063). If tax payable (TXP, WC03063) is missing here, it is set to 0. ACCR in fiscal year t is computed as:

$$ACCR_t = 2 * \frac{CA_t - Cash_t - CL_t + STD_t + TP_t - DP_t}{AT_t + AT_{t-1}},$$

where $CA_t = ACT_t - ACT_{t-1}$, $Cash_t = CHE_t - CHE_{t-1}$, $CL_t = LCT_t - LCT_{t-1}$, $STD_t = DLC_t - DLC_{t-1}$, and $TP_t = TXP_t - TXP_{t-1}$.

Anomaly 4: Net operating assets (NOA) We measure net operating assets as operating assets minus operating liabilities, divided by lagged total assets (AT, WC02999).

Operating assets equal total assets (AT, WC02999) minus cash and short-term investment (CHE, WC02001). Operating liabilities equal total assets minus the following: debt included in current liabilities (DLC, WC03051), long-term debt (DLTT, WC03251), common equity (CE, WC03501), minority interests (MIB, WC04055), and preferred stock (PSTK, WC03451). (The last two items are set to zero if they are missing.) NOA in fiscal year t is computed as:

$$NOA_t = \frac{(AT_t - CHE_t) - (AT_t - DLC_t - DLTT_t - MIB_t - PSTK_t - CE_t)}{AT_t}$$

Anomaly 5: Asset growth (AG) We measure asset growth as the most recent year-over-year annual growth rate of total assets (AT, WC02999). Following Watanabe, Xu, Yao, and Yu (2013), observations with calculated AG above 10 are deleted.

Anomaly 6: Investment to assets (INV) We compute investment-to-assets as the changes in gross property, plant, and equipment (PPEGT, WC02301) plus changes in inventory (INVT, WC02101), divided by lagged total assets (AT, WC02999). We delete observations with INV above 10 or less than -1. INV in fiscal year t is computed as:

$$INV_t = \frac{PPEGT_t - PPEGT_{t-1} + INVT_t - INVT_{t-1}}{AT_{t-1}}$$

Anomaly 7: Momentum (MOM) The momentum measure at the end of month $t-1$ is the cumulative return from month $t-12$ to month $t-2$.

Anomaly 8: Gross profitability (GP) Gross profit is sales minus the cost of goods sold, scaled by total assets. We measure gross profitability as total revenue (REVT, WC01001) minus the cost of goods sold (COGS, WC01051), divided by current total assets (AT, WC02999). If current total assets, total revenue, or cost of goods sold is negative, then GP is set to missing. Following Sun, Wei and Xie (2014), we exclude firm-year observations with GP less than -100% or greater than 100%. GP in fiscal year t is computed as:

$$GP_t = \frac{REVT_t - COGS_t}{AT_t}$$

Anomaly 9: Return on assets (ROA) ROA is WorldScope item WC08326.

Mispricing measure (MISP) For each of the previous anomalies, we assign a rank to each stock that reflects the sorting on that given anomaly variable, where the highest rank is assigned to the value of the anomaly variable associated with the lowest average abnormal return, as reported in the literature. For example, the empirical evidence on the momentum anomaly is that high past return is followed by high return (Jegadeesh and Titman (1993)). We therefore rank firms in each month by the momentum measure (cumulative returns in the past), and those with the highest past returns receive the lowest rank. The higher the rank, the greater the relative degree of overpricing according to the given anomaly variable.

A stock's composite rank is then the arithmetic average of its ranking percentile for each the anomalies. Among the stocks that satisfy our filters, we include all stocks with at least

three valid anomaly variables to construct the mispricing score. We construct the mispricing scores as the arithmetic average of the ranking percentile for NSI, CEI, ACCR, NOA, AG, INV, MOM, GP, and ROA. We refer to the stocks with the highest composite ranking as the most "overpriced" and to those with the lowest ranking as the most "underpriced."

In addition, we construct a revised mispricing measure as a robustness check. The revised measure is computed as the arithmetic average of the ranking percentile for ten anomalies. In the original nine we replace return-on-assets with return-on-equity (ROE), a related measure of profitability, and then we add book-to-market (BM) as another anomaly. We measure BM as the ratio of book value per share (WC05476) to year-end market price (WC05001), with negative BM values set to missing. To measure ROE, we first compute profit as annual revenue (REVT, WC01001) minus the following: cost of goods sold (COGS, WC01051), interest expense (INTS, WC01075), and selling general and administrative expenses (SGA, WC01101). Profit is then divided by book equity (CE, WC03501) for the most recently ended fiscal year to obtain the ROE value. Interest expense (INTS, WC01075) and selling general and administrative expenses (SGA, WC01101) are set to 0 if missing, while the other variables are required to have a non-missing value to calculate the ROE measure. In particular, ROE in fiscal year t is computed as $ROE_t = \frac{REVT_t - COGS_t - INTS_t - SGA_t}{CE_{t-1}}$.

A3. Fama French factor constructions and IVOL calculation

Construction of the Fama French three factors

We construct both monthly factors and daily factors for each country. The market factor is the value-weighted market return for each country minus the one-month U.S. Treasury bill rate. To construct the SMB and HML factors in each country, we form six value-weighted portfolios by sorting on size and the book-to-market ratio. Size is the market capitalization at the end of the previous June. The book-to-market ratio is the book value per share (WC05476) divided by the year-end market price (WC05001). We require a positive market capitalization and a positive BM ratio for a stock to be included in a factor portfolio. We first sort stocks into two size groups, using the 80th percentile of market capitalization as the breakpoint. Within each stock-size group, we then sort on BM and form three groups using the 30th and 70th percentiles as breakpoints. Finally, the monthly and daily SMB and HML factors are constructed using the same approach suggested in Fama and French (1993, 2012).

Idiosyncratic volatility (IVOL)

We follow Ang, Hodrick, Xing, and Zhang (2006, 2009) to construct the idiosyncratic volatility (IVOL) measure for each stock. Specifically, IVOL is calculated with respect to the local (country-specific) three-factor model using the following regression:

$$r_i = \alpha_i^L + \beta_i^L MKT^L + s_i^L SMB^L + h_i^L HML^L + e_i^L, \tag{9}$$

where r_i (the daily excess U.S. dollar return of stock i) and the local three factors are all expressed in U.S. dollars. The IVOL for stock i is measured as the standard deviation of the residual, e_i^L, when estimating equation (9) using daily excess returns over the past month. We require the number of zero daily returns in the estimation month to be less than five in order to compute IVOL for that month. For each country, we then form nine portfolios (3×3) by sorting independently on the mispricing score and IVOL. We require at least ten stocks in each of the nine portfolios to calculate a country's portfolio returns in a given month.

Table A1
Generic and Country-specific Filters for
Excluding non-Common Equity Datastream Securities

A. Generic Name Filters	
Non-common equity	Words searched
Duplicates	DUPLICATE DUPL DUP DUPE DULP DUPLI 1000DUPL XSQ
Depository Receipts	ADR GDR
Preferred Stock	PREFERRED PF PFD PREF 'PF'
Warrants	WARRANT WARRANTS WTS WTS2 WARRT
Debt	DEB DB DCB DEBT DEBENTURES DEBENTURE
Unit Trusts (2 word phrases)	RLST IT, INVESTMENT TRUST, INV TST, UNIT TRUST, UNT TST, TRUST
Unit Trusts (single words)	UT IT. .IT
Recommended by Ince and Porter (2006)	500 BOND DEFER DEP DEPY ELKS ETF FUND FD IDX INDEX LP MIPS MITS MITT MPS NIKKEI NOTE PERQS PINES PRTF PTNS PTSHP QUIBS QUIDS RATE RCPTS RECEIPTS REIT RETUR SCORE SPDR STRYPES TOPRS UNIT UNT UTS WTS XXXXX YIELD YLD
Expired securities	EXPIRED EXPD EXPIRY EXPY
B. Country-Specific Name Filters	
Country	Words searched
Canada	(Rights, Shares, Voting, subordinated voting): RTS SHS VTG SBVTG SUBD (Series): SR SER (Receipts are rights to receive stocks or options at a future date): RECPT Receipt (Exchangeable): EXH EXCHANGEABLE (Split Share Corporations a derivative of common stock): SPLIT
France	(certicates of investment or investment trusts): ADP CI CIP ORA ORCI OBSA OPCSM SGP SICAV FCP FCPR FCPE FCPI FCPIMT OPCVM
Germany	GENUSSCHEINE or GSH are securities, which are hybrid securities between a loan and equity: GENUSSCHEINE GSH
The U.K.	(ranking for dividend): ranking for dividend (book-keeping entry): PAID (Non-voting): NV

Appendix B. Results with Value-Weighted Portfolios

As a robustness check, Tables B1, B2, and B3 use value-weighted portfolios to repeat the analyses in Tables 3, 4, and 5, respectively.

Table B1
Alphas for Anomaly Long-Short Returns
(Value-Weighted Portfolios)

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. Alpha is the estimated intercept in a regression of the spread return on the country's market, size, and book-to-market factors. The long- and short-leg portfolios are value weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alphas, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.33	0.01	0.17	0.06	0.44	0.24
Composite equity issues	1.03	0.57	0.78	0.57	0.68	0.72
Total accruals	0.29	0.00	0.05	0.10	0.39	0.16
Net operating assets	0.53	0.13	-0.11	-0.01	0.31	0.16
Asset growth	0.46	0.31	0.38	-0.28	0.05	0.17
Investment/assets	0.45	0.21	-0.33	0.22	0.09	0.14
Momentum	2.17	1.21	1.44	0.49	2.05	1.48
Gross profitability	1.04	0.37	0.78	0.37	0.69	0.74
Return on assets	0.08	0.62	0.35	0.17	0.78	0.36
Mispricing measure (composite)	1.15	1.12	0.77	0.35	0.85	0.83
B. t-statistics						
Net stock issues	1.85	0.04	0.59	0.28	2.44	2.26
Composite equity issues	3.11	2.02	2.50	2.12	2.90	4.03
Total accruals	0.84	0.00	0.20	0.59	1.61	1.00
Net operating assets	1.98	0.63	-0.39	-0.04	1.83	1.33
Asset growth	1.98	1.36	1.63	-1.49	0.29	1.61
Investment/assets	1.86	0.83	-1.47	0.95	0.52	1.21
Momentum	5.06	3.97	3.72	1.49	6.42	5.98
Gross profitability	4.14	2.15	2.92	1.45	3.59	5.85
Return on assets	0.24	2.48	1.24	0.64	3.69	2.54
Mispricing measure (composite)	5.39	5.41	3.30	1.51	4.99	7.37

Table B2
Alphas for Anomaly Long-Short Returns Conditional on U.S. Alphas Equal to Zero (Value-Weighted Portfolios)

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. An anomaly's alpha in each of the five countries is estimated under the assumption that the anomaly's true alpha in the U.S. equals zero. Under that assumption, alpha is the estimated intercept in a regression of the spread return on the country's market, size, and book-to-market factors as well as the U.S. anomaly's abnormal return. The long- and short-leg portfolios are value weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alphas, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.17	-0.06	0.06	0.00	0.32	0.13
Composite equity issues	1.07	0.69	0.92	0.67	0.76	0.82
Total accruals	0.19	-0.06	0.03	0.07	0.31	0.09
Net operating assets	0.36	0.11	-0.01	-0.02	0.28	0.13
Asset growth	0.41	0.28	0.40	-0.28	0.02	0.15
Investment/assets	0.36	0.17	-0.37	0.19	0.04	0.08
Momentum	1.25	0.61	1.03	0.15	1.29	0.86
Gross profitability	1.12	0.35	0.76	0.40	0.55	0.73
Return on assets	-0.45	0.27	0.44	0.24	0.48	0.16
Mispricing measure (composite)	0.65	0.57	0.50	0.11	0.27	0.40
B. t-statistics						
Net stock issues	0.96	-0.24	0.19	0.00	1.81	1.25
Composite equity issues	3.10	2.49	2.66	2.43	2.95	4.59
Total accruals	0.57	-0.22	0.10	0.44	1.32	0.62
Net operating assets	1.36	0.51	-0.05	-0.14	1.67	1.11
Asset growth	1.79	1.22	1.69	-1.51	0.11	1.43
Investment/assets	1.46	0.65	-1.60	0.78	0.23	0.71
Momentum	3.40	2.23	2.71	0.49	4.39	4.61
Gross profitability	4.36	2.00	2.82	1.58	2.69	5.79
Return on assets	-1.19	0.96	1.49	0.94	2.14	1.14
Mispricing measure (composite)	2.92	2.66	2.15	0.52	1.59	4.05

Table B3
Alphas for Portfolios Sorted on IVOL and the Mispricing Measure (Value-Weighted Portfolios)

The table reports, for each country, the alpha on each of the nine value weighted portfolios formed by an independent 3 × 3 sort on IVOL and the composite mispricing measure that averages a stock's ranking percentiles across anomalies. All t-statistics (in parentheses) are based on the heteroskedasticity-consistent standard errors of White (1980).

Mispricing category	IVOL category			
	Low	Middle	High	High−Low
	A. Cross-Country Average			
Underpriced	0.34	0.41	0.38	0.03
	(4.27)	(4.49)	(2.38)	(0.19)
Middle	0.04	-0.03	-0.34	-0.38
	(0.51)	(-0.37)	(-2.35)	(-2.19)
Overpriced	-0.17	-0.36	-0.92	-0.75
	(-2.50)	(-4.01)	(-6.63)	(-4.81)
Over-Under	-0.52	-0.77	-1.30	-0.79
	(-4.74)	(-6.06)	(-7.19)	(-4.00)
All stocks	0.09	-0.01	-0.34	-0.43
	(1.43)	(-0.10)	(-2.74)	(-2.89)
	B. Canada			
Underpriced	0.54	0.55	0.49	-0.05
	(3.82)	(2.34)	(1.16)	(-0.10)
Middle	0.14	0.05	-0.68	-0.82
	(1.29)	(0.22)	(-2.05)	(-2.35)
Overpriced	-0.15	-0.60	-1.23	-1.08
	(-1.25)	(-2.68)	(-3.84)	(-3.22)
Over-Under	-0.69	-1.14	-1.73	-1.03
	(-3.51)	(-3.76)	(-3.45)	(-1.96)
All stocks	0.18	-0.03	-0.54	-0.72
	(2.90)	(-0.18)	(-1.94)	(-2.46)
	C. France			
Underpriced	0.49	0.26	0.65	0.16
	(2.97)	(1.39)	(1.95)	(0.42)
Middle	-0.05	-0.08	0.03	0.09
	(-0.41)	(-0.49)	(0.12)	(0.28)
Overpriced	-0.44	-0.52	-0.51	-0.08
	(-2.76)	(-2.95)	(-1.68)	(-0.22)
Over-Under	-0.93	-0.78	-1.17	-0.24
	(-4.17)	(-3.06)	(-2.76)	(-0.52)
All stocks	0.07	-0.13	0.11	0.04
	(0.91)	(-1.27)	(0.45)	(0.13)

Table B3 (continued)

Mispricing category	IVOL category			
	Low	Middle	High	High−Low
		D. Germany		
Underpriced	0.33	0.79	0.65	0.32
	(2.04)	(3.62)	(1.79)	(0.84)
Middle	-0.08	-0.27	-0.24	-0.15
	(-0.64)	(-1.34)	(-0.58)	(-0.35)
Overpriced	-0.20	-0.48	-1.45	-1.24
	(-1.39)	(-1.82)	(-3.82)	(-2.90)
Over-Under	-0.53	-1.27	-2.10	-1.56
	(-2.09)	(-3.52)	(-4.79)	(-3.09)
All stocks	0.02	0.00	-0.43	-0.45
	(0.28)	(-0.03)	(-1.24)	(-1.25)
		E. Japan		
Underpriced	-0.02	0.16	-0.01	0.01
	(-0.16)	(1.30)	(-0.08)	(0.04)
Middle	-0.03	-0.04	-0.25	-0.22
	(-0.33)	(-0.40)	(-1.71)	(-1.14)
Overpriced	-0.01	-0.15	-0.52	-0.51
	(-0.05)	(-1.22)	(-3.08)	(-2.43)
Over-Under	0.01	-0.31	-0.50	-0.52
	(0.06)	(-1.56)	(-2.18)	(-2.10)
All stocks	-0.05	0.01	-0.26	-0.21
	(-0.83)	(0.21)	(-2.03)	(-1.28)
		F. United Kingdom		
Underpriced	0.32	0.42	0.48	0.16
	(2.62)	(3.21)	(2.20)	(0.61)
Middle	0.16	0.08	-0.26	-0.42
	(1.05)	(0.67)	(-1.22)	(-1.57)
Overpriced	-0.20	-0.15	-0.78	-0.58
	(-1.79)	(-1.03)	(-3.48)	(-2.27)
Over-Under	-0.52	-0.57	-1.26	-0.74
	(-3.02)	(-2.80)	(-4.48)	(-2.26)
All stocks	0.11	0.09	-0.32	-0.43
	(1.00)	(1.00)	(-1.89)	(-2.00)

INTERNET APPENDIX

This appendix contains robustness results.

Tables I1 to I4 provide robustness results for Table 3 with the following specifications:

- Equally weighted (EW) long-short spreads
- Value-weighted (VW) long-short spreads
- Equally weighted (EW) CAPM alphas
- Value-weighted (VW) CAPM alphas

Tables I5 to I8 provide robustness results for Table 4 with the following specifications:

- EW long-short spreads conditional on U.S. long-short spreads equal to zero
- VW long-short spreads conditional on U.S. long-short spreads equal to zero
- EW CAPM alphas conditional on U.S. alphas equal to zero
- VW CAPM alphas conditional on U.S. alphas equal to zero

Tables I9 to I10 provide robustness results for Table 5 with the following specifications:

- EW FF3 alphas for portfolios sorted on IVOL and the revised mispricing measure
- VW FF3 alphas for portfolios sorted on IVOL and the revised mispricing measure

Table I1
Equally Weighted Anomaly Long-Short Return Spreads

The table reports the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. The long- and short-leg portfolios are equally weighted. The "average" column reports the return spread of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short return spread for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated return spread, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.34	0.32	0.47	0.57	0.87	0.54
Composite equity issues	1.12	0.80	0.26	0.40	0.87	0.69
Total accruals	0.28	0.39	0.41	0.24	0.51	0.34
Net operating assets	0.45	0.52	0.69	0.11	0.51	0.40
Asset growth	0.38	0.19	0.41	0.30	0.44	0.34
Investment/assets	0.33	0.45	0.52	0.28	0.67	0.46
Momentum	1.73	1.44	1.52	0.21	1.87	1.35
Gross profitability	0.53	0.26	0.66	0.11	0.62	0.46
Return on assets	-0.23	0.15	0.26	-0.09	0.66	0.15
Mispricing measure (composite)	1.25	1.23	1.30	0.46	1.62	1.16
B. t-statistics						
Net stock issues	1.86	1.78	2.84	4.53	6.90	6.14
Composite equity issues	5.66	4.13	1.18	1.83	6.39	5.31
Total accruals	1.42	3.26	2.61	2.95	4.99	3.93
Net operating assets	2.24	4.20	4.32	1.15	4.16	4.66
Asset growth	2.18	1.06	1.94	2.13	4.07	3.56
Investment/assets	1.80	2.98	2.91	2.26	6.81	5.84
Momentum	6.26	5.90	5.84	0.86	9.42	7.99
Gross profitability	2.89	1.75	4.62	0.63	5.51	5.52
Return on assets	-1.03	0.85	1.42	-0.59	4.60	1.57
Mispricing measure (composite)	6.99	8.84	7.92	3.95	15.26	14.83

Table I2
Value-Weighted Anomaly Long-Short Return Spreads

The table reports the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. The long- and short-leg portfolios are value-weighted. The "average" column reports the return spread of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short return spread for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated return spread, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.38	-0.01	0.36	0.11	0.39	0.27
Composite equity issues	1.10	0.57	0.71	0.66	0.66	0.74
Total accruals	0.30	-0.06	0.39	0.09	0.42	0.21
Net operating assets	0.47	0.24	0.14	0.01	0.24	0.19
Asset growth	0.52	0.55	0.52	0.16	0.18	0.38
Investment/assets	0.35	0.25	-0.03	0.45	0.14	0.27
Momentum	1.96	0.95	1.29	0.36	1.64	1.24
Gross profitability	0.67	0.15	0.61	0.15	0.42	0.44
Return on assets	0.01	0.17	0.37	-0.10	0.54	0.20
Mispricing measure (composite)	1.05	0.93	0.81	0.36	0.64	0.76
B. t-statistics						
Net stock issues	1.65	-0.03	1.17	0.52	2.07	2.09
Composite equity issues	2.99	1.97	2.17	2.29	2.68	3.70
Total accruals	0.88	-0.21	1.45	0.54	1.72	1.25
Net operating assets	1.69	1.09	0.56	0.06	1.41	1.55
Asset growth	2.08	2.22	2.14	0.79	0.97	3.19
Investment/assets	1.42	0.99	-0.12	2.06	0.87	2.36
Momentum	4.46	2.90	3.17	1.07	4.56	4.66
Gross profitability	2.16	0.77	2.44	0.62	1.88	3.13
Return on assets	0.04	0.61	1.36	-0.43	2.35	1.31
Mispricing measure (composite)	4.84	4.18	3.60	1.76	3.28	6.13

Table I3
CAPM Alphas for Equally Weighted Anomaly Long-Short Returns

The table reports the CAPM alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. Alpha is the estimated intercept in a regression of the spread return on the country's market factor. The long- and short-leg portfolios are equally weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alpha, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.37	0.36	0.49	0.62	0.91	0.57
Composite equity issues	1.08	0.70	0.15	0.24	0.84	0.59
Total accruals	0.26	0.39	0.43	0.24	0.53	0.35
Net operating assets	0.47	0.50	0.71	0.11	0.53	0.41
Asset growth	0.42	0.22	0.49	0.26	0.46	0.35
Investment/assets	0.36	0.46	0.58	0.23	0.68	0.47
Momentum	1.77	1.57	1.68	0.29	1.95	1.47
Gross profitability	0.56	0.27	0.65	0.16	0.66	0.47
Return on assets	-0.18	0.30	0.34	-0.07	0.69	0.20
Mispricing measure (composite)	1.29	1.28	1.38	0.46	1.67	1.21
B. t-statistics						
Net stock issues	2.24	2.14	3.01	4.90	7.31	7.22
Composite equity issues	5.75	3.93	0.71	1.25	6.48	5.01
Total accruals	1.33	3.22	2.77	2.95	5.22	4.10
Net operating assets	2.37	4.10	4.42	1.18	4.42	4.91
Asset growth	2.49	1.23	2.41	1.85	4.22	3.71
Investment/assets	2.01	3.19	3.43	1.93	6.96	5.99
Momentum	6.50	6.68	6.55	1.23	10.14	8.86
Gross profitability	3.10	1.92	4.58	0.99	5.88	5.57
Return on assets	-0.85	1.75	1.87	-0.44	4.81	2.09
Mispricing measure (composite)	7.43	9.22	8.45	4.04	16.26	15.94

Table I4
CAPM Alphas for Value-Weighted Anomaly Long-Short Returns

The table reports the CAPM alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. Alpha is the estimated intercept in a regression of the spread return on the country's market factor. The long- and short-leg portfolios are value-weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alpha, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.43	0.07	0.40	0.17	0.46	0.34
Composite equity issues	1.02	0.53	0.57	0.49	0.62	0.64
Total accruals	0.28	-0.06	0.39	0.09	0.45	0.22
Net operating assets	0.50	0.19	0.17	0.01	0.27	0.21
Asset growth	0.56	0.57	0.63	0.13	0.19	0.40
Investment/assets	0.39	0.26	0.02	0.39	0.17	0.25
Momentum	2.05	1.15	1.53	0.42	1.79	1.39
Gross profitability	0.68	0.17	0.58	0.17	0.53	0.47
Return on assets	0.07	0.37	0.45	-0.02	0.64	0.26
Mispricing measure (composite)	1.07	1.07	0.89	0.37	0.74	0.81
B. t-statistics						
Net stock issues	2.17	0.31	1.30	0.80	2.46	2.88
Composite equity issues	2.92	1.86	1.78	1.94	2.59	3.47
Total accruals	0.82	-0.21	1.42	0.52	1.85	1.34
Net operating assets	1.82	0.88	0.64	0.09	1.59	1.69
Asset growth	2.29	2.28	2.62	0.68	1.04	3.41
Investment/assets	1.57	1.00	0.07	1.82	1.05	2.13
Momentum	4.73	3.63	3.78	1.31	5.22	5.44
Gross profitability	2.16	0.86	2.28	0.73	2.47	3.39
Return on assets	0.20	1.35	1.63	-0.11	2.75	1.74
Mispricing measure (composite)	5.01	4.97	3.99	1.90	4.13	6.90

Table I5
Alphas for Equally Weighted Anomaly Long-Short Returns Conditional on U.S. Long-Short Return Spreads Equal to Zero

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. An anomaly's alpha in each of the five countries is estimated under the assumption that the anomaly's true return spread in the U.S. equals zero. Under that assumption, alpha is the estimated intercept in a regression of the spread return on the U.S. anomaly's abnormal return (return spread). The long- and short-leg portfolios are equally weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alphas, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.04	0.11	0.38	0.45	0.61	0.33
Composite equity issues	1.34	1.05	0.52	0.54	1.01	0.90
Total accruals	0.06	0.37	0.38	0.25	0.46	0.27
Net operating assets	0.13	0.48	0.61	0.14	0.37	0.29
Asset growth	0.11	0.09	0.29	0.26	0.37	0.23
Investment/assets	0.02	0.26	0.31	0.21	0.56	0.28
Momentum	1.09	0.69	0.96	-0.06	1.27	0.79
Gross profitability	0.53	0.27	0.64	0.11	0.64	0.46
Return on assets	-0.69	-0.06	0.03	-0.06	0.39	-0.07
Mispricing measure (composite)	0.86	0.83	0.76	0.45	1.35	0.84
B. t-statistics						
Net stock issues	0.20	0.67	2.32	3.51	5.01	4.32
Composite equity issues	6.99	5.48	2.30	2.50	7.37	7.70
Total accruals	0.34	3.10	2.52	3.01	4.76	3.19
Net operating assets	0.69	3.74	3.94	1.40	3.00	3.58
Asset growth	0.65	0.60	1.63	1.79	3.45	2.42
Investment/assets	0.09	1.68	1.72	1.66	5.61	3.90
Momentum	4.37	3.19	3.41	-0.26	6.64	6.07
Gross profitability	2.82	1.85	4.63	0.60	5.60	5.51
Return on assets	-2.77	-0.30	0.15	-0.37	2.29	-0.76
Mispricing measure (composite)	4.13	6.00	3.71	3.74	10.39	11.65

Table I6
Alphas for Value-Weighted Anomaly Long-Short Returns Conditional on U.S. Long-Short Return Spreads Equal to Zero

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. An anomaly's alpha in each of the five countries is estimated under the assumption that the anomaly's true return spread in the U.S. equals zero. Under that assumption, alpha is the estimated intercept in a regression of the spread return on the U.S. anomaly's abnormal return (return spread). The long- and short-leg portfolios are value-weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alphas, and Panel B reports the corresponding *t*-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.02	-0.12	0.19	0.01	0.24	0.07
Composite equity issues	1.33	0.75	0.92	0.82	0.83	0.93
Total accruals	0.20	-0.10	0.38	0.07	0.35	0.16
Net operating assets	0.28	0.21	0.20	0.02	0.23	0.16
Asset growth	0.40	0.43	0.51	0.08	0.10	0.30
Investment/assets	0.28	0.21	-0.11	0.41	0.07	0.20
Momentum	1.37	0.54	0.90	0.14	1.12	0.82
Gross profitability	0.61	0.11	0.59	0.11	0.34	0.39
Return on assets	-0.25	-0.07	0.37	-0.11	0.35	0.06
Mispricing measure (composite)	0.75	0.55	0.54	0.30	0.16	0.46
B. *t*-statistics						
Net stock issues	0.10	-0.51	0.66	0.05	1.32	0.58
Composite equity issues	3.72	2.62	2.76	2.88	3.32	5.07
Total accruals	0.62	-0.37	1.39	0.43	1.48	0.96
Net operating assets	1.04	0.94	0.76	0.12	1.35	1.30
Asset growth	1.65	1.77	2.02	0.43	0.53	2.65
Investment/assets	1.10	0.81	-0.46	1.80	0.42	1.82
Momentum	3.74	1.94	2.36	0.43	3.78	4.22
Gross profitability	1.98	0.55	2.39	0.46	1.51	2.82
Return on assets	-0.73	-0.23	1.31	-0.46	1.58	0.41
Mispricing measure (composite)	3.36	2.48	2.34	1.51	0.85	4.15

Table I7
CAPM Alphas for Equally Weighted Anomaly Long-Short Returns Conditional on U.S. Alphas Equal to Zero

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. An anomaly's alpha in each of the five countries is estimated under the assumption that the anomaly's true alpha in the U.S. equals zero. Under that assumption, alpha is the estimated intercept in a regression of the spread return on the country's market factor as well as the U.S. anomaly's abnormal return. The long- and short-leg portfolios are equally weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alphas, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.02	0.08	0.40	0.50	0.56	0.32
Composite equity issues	1.35	0.99	0.48	0.39	1.02	0.83
Total accruals	0.04	0.37	0.39	0.24	0.47	0.27
Net operating assets	0.03	0.40	0.66	0.12	0.37	0.27
Asset growth	0.09	0.13	0.41	0.26	0.39	0.24
Investment/assets	-0.05	0.23	0.40	0.17	0.57	0.26
Momentum	1.13	0.80	1.12	0.00	1.32	0.89
Gross profitability	0.54	0.28	0.65	0.16	0.66	0.47
Return on assets	-0.62	0.08	0.14	0.00	0.41	-0.01
Mispricing measure (composite)	0.87	0.72	0.83	0.36	1.37	0.83
B. t-statistics						
Net stock issues	0.12	0.45	2.43	3.75	4.17	4.42
Composite equity issues	6.52	4.93	1.95	2.01	6.88	7.44
Total accruals	0.23	3.09	2.64	2.93	4.87	3.32
Net operating assets	0.14	3.10	4.04	1.25	2.98	3.33
Asset growth	0.55	0.83	2.22	1.78	3.56	2.56
Investment/assets	-0.26	1.53	2.20	1.33	5.49	3.59
Momentum	4.50	3.89	4.04	0.00	7.11	6.94
Gross profitability	3.00	2.00	4.71	0.98	5.86	5.53
Return on assets	-2.54	0.39	0.68	-0.03	2.42	-0.14
Mispricing measure (composite)	3.80	4.88	3.59	2.90	10.17	11.73

Table I8
CAPM Alphas for Value-Weighted Anomaly Long-Short Returns Conditional on U.S. Alphas Equal to Zero

The table reports the alphas (in percent) of the monthly return spread between the portfolios containing stocks in the highest and lowest deciles of the ranking variable. An anomaly's alpha in each of the five countries is estimated under the assumption that the anomaly's true alpha in the U.S. equals zero. Under that assumption, alpha is the estimated intercept in a regression of the spread return on the country's market factor as well as the U.S. anomaly's abnormal return. The long- and short-leg portfolios are value-weighted. The "average" column reports the alpha of an equally weighted cross-country combination of the long-short spreads. Also reported is the long-short alpha for the composite mispricing measure that averages a stock's ranking percentiles across anomalies. Panel A reports the estimated alphas, and Panel B reports the corresponding t-statistics based on the heteroskedasticity-consistent standard errors of White (1980).

Anomaly	Canada	France	Germany	Japan	U.K.	Average
A. Alpha estimates (percent/month)						
Net stock issues	0.07	-0.04	0.17	0.03	0.29	0.12
Composite equity issues	1.18	0.73	0.89	0.70	0.88	0.87
Total accruals	0.18	-0.11	0.37	0.06	0.37	0.16
Net operating assets	0.32	0.16	0.22	0.02	0.27	0.18
Asset growth	0.37	0.39	0.63	0.07	0.09	0.29
Investment/assets	0.28	0.20	-0.08	0.35	0.09	0.16
Momentum	1.36	0.70	1.11	0.16	1.18	0.89
Gross profitability	0.59	0.11	0.52	0.12	0.46	0.41
Return on assets	-0.23	0.10	0.53	-0.01	0.40	0.12
Mispricing measure (composite)	0.63	0.61	0.63	0.21	0.21	0.44
B. t-statistics						
Net stock issues	0.37	-0.18	0.59	0.15	1.65	1.09
Composite equity issues	3.32	2.46	2.60	2.69	3.40	4.88
Total accruals	0.54	-0.39	1.36	0.34	1.57	1.01
Net operating assets	1.19	0.74	0.83	0.11	1.54	1.44
Asset growth	1.54	1.55	2.55	0.35	0.45	2.58
Investment/assets	1.12	0.77	-0.35	1.56	0.51	1.43
Momentum	3.68	2.54	2.88	0.54	4.10	4.79
Gross profitability	1.86	0.57	2.12	0.52	2.12	2.96
Return on assets	-0.66	0.35	1.85	-0.03	1.73	0.85
Mispricing measure (composite)	2.76	2.70	2.70	1.14	1.19	4.06

Table I9
FF3 Alphas for Equally Weighted Portfolios Sorted on IVOL and the Revised Mispricing Measure

The table reports, for each country, the alpha on each of the nine portfolios formed by an independent 3 × 3 sort on IVOL and the revised mispricing measure that averages a stock's ranking percentiles across ten anomalies. The portfolio returns are equally weighted, and the alphas are the estimated intercepts in a regression of the portfolio excess return on the country's market, size, and book-to-market factors. All t-statistics (in parentheses) are based on the heteroskedasticity-consistent standard errors of White (1980).

Mispricing category	IVOL category			
	Low	Middle	High	High−Low
	A. Cross-Country Average			
Underpriced	0.54	0.56	0.25	-0.29
	(9.13)	(9.88)	(2.20)	(-2.29)
Middle	0.17	0.15	-0.22	-0.39
	(3.18)	(2.90)	(-1.97)	(-3.08)
Overpriced	-0.11	-0.24	-0.75	-0.64
	(-1.87)	(-3.84)	(-6.27)	(-4.78)
Over-Under	-0.65	-0.81	-1.00	-0.35
	(-9.86)	(-11.34)	(-9.29)	(-3.30)
All stocks	0.20	0.16	-0.26	-0.46
	(4.32)	(3.51)	(-2.59)	(-3.99)
	B. Canada			
Underpriced	0.71	0.84	0.49	-0.21
	(6.19)	(5.54)	(1.92)	(-0.80)
Middle	0.16	0.24	-0.12	-0.29
	(1.55)	(1.80)	(-0.42)	(-0.94)
Overpriced	-0.21	-0.29	-0.64	-0.44
	(-1.80)	(-1.86)	(-2.25)	(-1.49)
Over-Under	-0.91	-1.13	-1.14	-0.22
	(-6.81)	(-5.96)	(-4.10)	(-0.76)
All stocks	0.23	0.24	-0.17	-0.40
	(2.98)	(2.12)	(-0.73)	(-1.69)
	C. France			
Underpriced	0.48	0.59	0.30	-0.18
	(4.15)	(6.27)	(1.78)	(-0.85)
Middle	0.18	0.08	-0.15	-0.33
	(1.86)	(0.89)	(-0.89)	(-1.69)
Overpriced	-0.10	-0.41	-0.93	-0.83
	(-0.91)	(-3.62)	(-4.86)	(-3.72)
Over-Under	-0.58	-1.00	-1.23	-0.65
	(-4.05)	(-7.20)	(-6.40)	(-2.93)
All stocks	0.18	0.10	-0.27	-0.45
	(2.30)	(1.52)	(-1.88)	(-2.59)

Table I9 (continued)

Mispricing category	IVOL category			
	Low	Middle	High	High−Low
	D. Germany			
Underpriced	0.66	0.70	0.27	-0.38
	(6.00)	(5.88)	(1.17)	(-1.50)
Middle	0.22	0.23	-0.37	-0.59
	(2.33)	(1.69)	(-1.66)	(-2.44)
Overpriced	-0.26	-0.33	-0.91	-0.65
	(-2.12)	(-2.03)	(-3.50)	(-2.19)
Over-Under	-0.92	-1.02	-1.18	-0.26
	(-5.54)	(-5.51)	(-5.10)	(-1.02)
All stocks	0.21	0.19	-0.32	-0.53
	(3.08)	(1.91)	(-1.62)	(-2.41)
	E. Japan			
Underpriced	0.26	0.38	-0.05	-0.31
	(3.01)	(4.87)	(-0.40)	(-2.14)
Middle	0.08	0.23	-0.14	-0.22
	(1.08)	(4.64)	(-1.39)	(-1.58)
Overpriced	-0.07	-0.03	-0.51	-0.44
	(-0.86)	(-0.42)	(-4.14)	(-2.89)
Over-Under	-0.32	-0.41	-0.46	-0.13
	(-3.19)	(-3.51)	(-3.46)	(-1.09)
All stocks	0.08	0.19	-0.22	-0.30
	(1.23)	(4.88)	(-2.24)	(-2.26)
	F. United Kingdom			
Underpriced	0.59	0.49	0.52	-0.07
	(5.32)	(4.95)	(2.63)	(-0.34)
Middle	0.24	0.09	-0.21	-0.45
	(2.47)	(0.88)	(-1.32)	(-2.58)
Overpriced	0.01	-0.16	-0.77	-0.78
	(0.10)	(-1.48)	(-4.11)	(-3.60)
Over-Under	-0.58	-0.66	-1.30	-0.72
	(-4.77)	(-5.47)	(-6.30)	(-3.11)
All stocks	0.27	0.15	-0.19	-0.47
	(3.25)	(1.83)	(-1.28)	(-2.85)

Table I10
FF3 Alphas for Value-Weighted Portfolios Sorted on IVOL and the Revised Mispricing Measure

The table reports, for each country, the alpha on each of the nine portfolios formed by an independent 3 × 3 sort on IVOL and the revised mispricing measure that averages a stock's ranking percentiles across ten anomalies. The portfolio returns are value-weighted, and the alphas are the estimated intercepts in a regression of the portfolio excess return on the country's market, size, and book-to-market factors. All t-statistics (in parentheses) are based on the heteroskedasticity-consistent standard errors of White (1980).

Mispricing category	IVOL category			
	Low	Middle	High	High−Low
	A. Cross-Country Average			
Underpriced	0.26	0.35	0.30	0.03
	(3.45)	(3.78)	(1.79)	(0.19)
Middle	0.11	0.05	-0.35	-0.45
	(1.39)	(0.62)	(-2.55)	(-2.75)
Overpriced	-0.14	-0.32	-0.79	-0.65
	(-2.10)	(-3.71)	(-5.62)	(-3.89)
Over-Under	-0.40	-0.67	-1.09	-0.68
	(-3.87)	(-5.35)	(-6.05)	(-3.33)
All stocks	0.09	-0.01	-0.34	-0.44
	(1.51)	(-0.16)	(-2.75)	(-2.93)
	B. Canada			
Underpriced	0.40	0.45	0.63	0.23
	(2.91)	(2.03)	(1.50)	(0.51)
Middle	0.15	0.00	-0.89	-1.04
	(1.27)	(-0.02)	(-2.71)	(-2.90)
Overpriced	-0.17	-0.36	-0.94	-0.77
	(-1.38)	(-1.63)	(-2.73)	(-2.13)
Over-Under	-0.57	-0.81	-1.57	-1.00
	(-3.00)	(-2.72)	(-3.15)	(-1.91)
All stocks	0.19	-0.02	-0.51	-0.70
	(2.99)	(-0.15)	(-1.84)	(-2.38)
	C. France			
Underpriced	0.25	0.27	0.81	0.55
	(1.49)	(1.43)	(2.47)	(1.49)
Middle	0.16	-0.03	-0.20	-0.36
	(1.27)	(-0.16)	(-0.66)	(-1.02)
Overpriced	-0.21	-0.57	-0.28	-0.08
	(-1.40)	(-3.55)	(-0.94)	(-0.22)
Over-Under	-0.46	-0.84	-1.09	-0.63
	(-1.99)	(-3.39)	(-2.65)	(-1.40)
All stocks	0.08	-0.14	0.11	0.03
	(1.00)	(-1.40)	(0.46)	(0.11)

Table I10 (continued)

Mispricing category	IVOL category			
	Low	Middle	High	High−Low
	D. Germany			
Underpriced	0.31	0.53	0.27	-0.03
	(1.88)	(2.52)	(0.63)	(-0.08)
Middle	0.02	0.24	0.20	0.17
	(0.19)	(1.19)	(0.61)	(0.52)
Overpriced	-0.24	-0.63	-1.42	-1.18
	(-1.55)	(-2.36)	(-3.86)	(-2.77)
Over-Under	-0.55	-1.16	-1.70	-1.15
	(-2.11)	(-3.21)	(-3.90)	(-2.32)
All stocks	0.01	-0.02	-0.49	-0.50
	(0.26)	(-0.10)	(-1.40)	(-1.40)
	E. Japan			
Underpriced	0.26	0.44	0.17	-0.09
	(2.10)	(3.17)	(0.76)	(-0.32)
Middle	0.12	0.04	-0.20	-0.33
	(0.85)	(0.30)	(-0.99)	(-1.29)
Overpriced	-0.10	-0.16	-0.67	-0.57
	(-0.89)	(-1.03)	(-3.01)	(-2.17)
Over-Under	-0.36	-0.60	-0.84	-0.48
	(-2.12)	(-2.77)	(-3.01)	(-1.45)
All stocks	0.11	0.08	-0.31	-0.43
	(0.98)	(0.94)	(-1.86)	(-1.96)
	F. United Kingdom			
Underpriced	0.26	0.44	0.17	-0.09
	(2.10)	(3.17)	(0.76)	(-0.32)
Middle	0.12	0.04	-0.20	-0.33
	(0.85)	(0.30)	(-0.99)	(-1.29)
Overpriced	-0.10	-0.16	-0.67	-0.57
	(-0.89)	(-1.03)	(-3.01)	(-2.17)
Over-Under	-0.36	-0.60	-0.84	-0.48
	(-2.12)	(-2.77)	(-3.01)	(-1.45)
All stocks	0.11	0.08	-0.31	-0.43
	(0.98)	(0.94)	(-1.86)	(-1.96)