ACCRUAL ANOMALY AND IDIOSYNCRATIC RISK: INTERNATIONAL EVIDENCE

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ABSTRACT

In this study, we show that accrual abnormal returns are positively correlated to idiosyncratic risk in international equity markets. In addition, we find that idiosyncratic risk has less impact on accrual abnormal returns for developed countries than emerging countries. Our results are robust to different model selections, such as portfolio approach and regression analysis, across countries. Our results support the mispricing explanation of accrual anomaly around the world.

JEL: G12, G15

KEYWORDS: Accrual Anomaly, Idiosyncratic Risk, International Equity Market, Limits of Arbitrage

INTRODUCTION

Sloan (1996) demonstrates strong and robust evidence that taking long (short) position in stocks with low (high) accruals generates significant abnormal returns the following year. Since this influential study, accrual anomaly has been extended and applied in researches in both financial economics and accounting. Understanding accruals and its impacts has become increasingly important in asset allocation, security analysis, and other applications. Although accruals have been extensively studied in the U.S. capital market, they are less explored internationally. In this study, we examine accrual anomaly and its correlation with idiosyncratic risk around the world.

We begin by examining abnormal returns of zero-cost trading strategy formed on accrual anomaly in 43 countries during 1989-2009 time period. We first divide all stocks in each country into five quintiles based on the ranking of accruals. We calculate equal-weighted monthly abnormal returns as longing the quintile with the lowest accruals and shorting the quintile with the highest accruals every month. Our results show that zero-cost trading strategy produces significant average monthly abnormal returns in 10 countries, including U.S. To examine if accrual abnormal returns can be explained by some well-known risk factors, we apply the Fama-French three-factor model plus the momentum factor (Fama and French, 1992, 1993, Carhart, 1997) to examine risk-adjusted returns (i.e. the α's).

When applying factor models in a global context, a natural question is whether securities are priced locally or globally (Karolyi and Stulz, 2003). Griffin (2002) examines country-specific and global versions of the Fama-French model. The author finds that domestic factor model explains much more time-series variation in returns and generally has lower pricing errors than global model. In a recent study, Hou et al. (2011) also find that local and international versions of their multifactor models have lower pricing errors than global versions, and it is particularly true for emerging markets. Ferreira et al. (2006) use both domestic and international models to evaluate mutual fund performance around the world. Their results show that domestic and international models provide similar fund performance measures. Following these studies, we apply domestic model in this study since no significant contributions are present from the foreign components of international model. Our risk-adjusted α's indicate that most of the significant abnormal returns from zero-cost strategy still exist after controlling for the risk factors. It indicates that accrual anomaly exists around the world. Our next question is what factors could contribute the existence of accrual anomaly. Many studies have provided various explanations of the existence of anomalies. It has been suggested that anomalies indicate either market inefficiency (mispricing) or inadequacies in the underlying asset-pricing models. In this study, we do not attempt to address inadequacies of existing asset-pricing models or seek additional risk factors. We focus on the test of mispricing explanation by examining the impact of idiosyncratic risk on stock abnormal returns.

Shleifer and Vishny (1997) and Pontiff (1996, 2006) argue that idiosyncratic risk represents a significant cost for risk-averse arbitrageurs, who cannot hedge it completely. Due to the limits of arbitrage, equity anomalies are not driven away by rational investors. If idiosyncratic risk does limit arbitrageurs from offsetting the choices of irrational investors, abnormal returns associated with various anomalies will be greater among high idiosyncratic risk stocks. In other words, idiosyncratic risk should be positively correlated to abnormal returns. To examine the relationship between idiosyncratic risk and abnormal returns, we first use an Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) model to calculate conditional idiosyncratic risk for each stock. Then, we divide stocks into quintiles in each country using the ranking of conditional idiosyncratic risk and the ranking of accrual anomaly, independently. We form 5x5 portfolios based on interactions of quintiles of conditional idiosyncratic risk and quintiles of accruals. We then calculate abnormal returns at each idiosyncratic risk quintile. We find that accrual abnormal returns for high-idiosyncratic-risk stocks are always higher than abnormal returns for low-idiosyncratic-risk stocks. It suggests that idiosyncratic risk is positively correlated to abnormal returns. We also find that abnormal returns become insignificant among low-idiosyncratic-risk stocks. These findings are present in both developed and emerging countries. The results are consistent with the mispricing theory.

To examine the robustness of the positive correlation, we run more tests using regression analysis. We use monthly risk-adjusted abnormal returns from zero-cost portfolios (i.e. α's from the Fama-French model) as dependent variable and zero-cost portfolio idiosyncratic risk as main independent variable, controlling for various country level characteristics. We define zero-cost portfolio idiosyncratic risk as value-weighted average idiosyncratic risk of stocks with long positions minus value-weighted average idiosyncratic risk of stocks with short positions. We apply panel regression analysis with country and year fixed effects across countries. Our results confirm that there is a strong positive correlation between abnormal returns and idiosyncratic risk at portfolio level even after controlling for country-level characteristics. Under the mispricing hypothesis, better governance, stronger investor protection, higher accounting quality, and higher market efficiency limit opportunities for mispricing (Barberis and Thaler, 2003, Watanabe et al., 2011). Therefore, we expect lower abnormal returns in developed countries. Furthermore, if idiosyncratic risk is indeed a significant factor causing the anomalies, the same idiosyncratic risk would have less impact on abnormal returns in developed economies than in emerging economies. To test these hypotheses, we use a dummy variable to distinguish abnormal returns between developed and emerging countries and an interaction term of the dummy variable and idiosyncratic risk to differentiate the impacts of idiosyncratic risk. Our regression results do not show strong support for the hypothesis that developed countries have lower abnormal returns.

Although we document a lower abnormal return, but it is not significant. However, we provide evidence to support the hypothesis that the same level of idiosyncratic risk has less impact on abnormal returns for developed countries than for emerging countries by showing a significant interaction term. Overall, our results provide evidence to support the mispricing explanation.This paper contributes to the growing literature that examines anomalies in several ways. First, we document accrual anomaly exists across countries for a long time period. Although accrual anomaly is well-known for the U.S. market, they are less explored in other countries. Second, we provide strong evidence that idiosyncratic risk contributes to the existence of accrual anomaly. We provide results that support the limits of arbitrage theory in global markets. Finally, we provide new evidence to support the mispricing explanation by showing a less impact of idiosyncratic risk on abnormal returns in developed countries. The rest of the paper proceeds as follows. The next section provides a literature review of the subject of this study. Next, we describe data and methodology. Empirical results are presented in the following section. The paper closes with some concluding remarks.

LITERATURE REVIEW

Sloan (1996) investigates whether stock prices fully reflect information in accruals and cash flows about future earnings. The author demonstrates that earnings performance related to accrual component exhibits lower persistence than cash flow component. Stock prices fail to distinguish the differential persistence of accruals and cash flows. Investors tend to overweight (underweight) accruals (cash flows). Therefore, firms with low accruals earn significantly higher abnormal returns than firms with high accruals. After the identification of accrual anomaly, many studies have provided further evidence to show that it is persistent over time and can be observed among even more sophisticated investors (Bradshaw et al, 2001, Barth and Hutton, 2004, Teoh and Wong, 2001, Richardson, 2003).

Accrual anomaly has been extended and applied in many studies in financial economics and accounting. For example, Chan et al. (2006) and Thomas and Zhang (2002) investigate different components of accruals to identify the real component that contribute to accrual anomaly. Xie (2001) and Chan et al. (2006) examine how management manipulation affects accruals. Other studies (Collins and Hribar, 2000, Desai et al., 2004) examine if accrual anomaly can be distinguished from other return patterns, such as post-earnings announcement drift and value-glamour anomaly. Richardson et al. (2005) and Fairfield et al. (2003) study if accrual anomaly is due to growth in net operating assets or mergers. Pincus et al. (2007) study accrual anomaly in 20 countries to examine whether it is a local manifestation or a global phenomenon. They found that stock prices overweight accruals in general. Accrual anomaly is more likely to occur in common law countries than code law countries.

Identification of the causes of existence of anomalies is an extensively studied area. One of the explanations is mispricing theory. Under mispricing theory, it is costs that limit arbitrageurs in their efforts at keeping markets efficient (see Scholes (1972), Shiller (1984), Delong et al. (1990), Pontiff (1996 and 2006), Shleifer and Vishny (1997), and Barberis and Thaler (2003)). Shleifer and Vishny (1997) and Pontiff (2006) identify idiosyncratic risk as the primary arbitrage holding cost. Pontiff (1996), (2006) and Shleifer and Vishny (1997) assert that arbitrageurs will trade on a mispricing, but only to the point where the marginal benefit of a position is equal to its cost, because idiosyncratic risk represents a significant cost that prevents arbitrageurs from driving abnormal returns away. Therefore, higher abnormal returns would be observed among high idiosyncratic risk stocks and lower returns among low idiosyncratic risk stocks (Ali, Hwang, and Trombley, 2003, Mendenhall, 2004, Mashruwala, Rajgopal and Shevlin, 2006, and Wei and Zhang, 2007, among others.).

There is considerable controversy among academics on the empirical relation between idiosyncratic risk and expected returns. Both negative (Ang, Hodrick, Xing, and Zhang, 2006 and 2009) and positive relations (Malkiel and Xu, 2006; Fu, 2009) are documented. Idiosyncratic risk is usually calculated as the residual variance of a mispriced stock from a traditional market model or Fama French model. In a recent study, Fu (2009) demonstrates that idiosyncratic volatility does not follow a random walk. Therefore, commonly used Ordinary Least Square (OLS) method may not be appropriate to calculate idiosyncratic risk. To capture the time-variation of expected idiosyncratic risk, Fu (2009) proposes an Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) model. Using this approach, the author documents a strong positive relation between expected idiosyncratic volatility and returns in U.S. markets.Idiosyncratic risk has been used to explain why accrual anomaly is not arbitraged away. Mashruwala et al. show that accrual anomaly is concentrated in firms with high idiosyncratic risk in U.S. market. The authors use the traditional method (the residual variance from regression using the classic CAPM model and Fama-French model) to measure idiosyncratic risk in their study. Our study is similar to Mashruwala et al. in examining the contribution of idiosyncratic risk on accrual anomaly. However, our study applies a more rigorous method to calculate idiosyncratic risk and analyze the relationship at an international setting, which allows us to further test the limits of arbitrage theory.

DATA AND METHODOLOGY

We collect monthly returns, stock prices, and number of shares outstanding from 1989 through 2009 for firms in 43 countries from Thomson Financial's DataStream database. All variables are expressed in U.S. dollar. We restrict our analysis to common-ordinary stocks trading in the companies' home markets. Unlike most of previous studies in literature, we use DataStream stock data to study the U.S. equity market. Hou, Karolyi, and Kho (2011) show that DataStream produces average monthly returns that are close to the CRSP/COMPUSTAT results reported in literature. DeMoor and Sercu (2005) also show that their results are very similar for different sets of assets when comparing CRSP/Compustat to DataStram/WorldScope U.S. sample. Accounting data is collected from WorldScope to form accrual anomaly. We collect a number of country characteristics that are likely to affect equity returns. A summary of country-level variables are listed in Appendix A.

Following Pincus, Rajgopal, and Venkatachalam (2007), we measure accrual anomaly as net income (WorldScope 01651) minus operating cash flows (WorldScope 04860) scaled by lagged total assets (WorldScope 07230). We use zero-cost strategy to construct portfolios based on accrual anomaly. In June of each year t, we rank all stocks in each country in ascending order (from the lowest accruals to the highest accruals). We then divide stocks into quintiles based on the ranking for fiscal year ending in calendar year t-1. We take long positions for stocks in quintile with the lowest accruals and short positions for stocks in quintile with the highest accruals. Monthly equal-weighed portfolio returns are calculated from July of year t to June of year t+1, and portfolios are re-balanced in June of year t+1.

To test if abnormal returns can be explained by risk factors, we estimate portfolio risk-adjusted returns using domestic Fama-French four-factor model. We investigate the intercept term, α. If abnormal returns of zero-cost portfolios can be explained by risk factors, we should observe an insignificant α. We do not use the market model in this study because CAPM assumes constant systemic risk over time. This is not true, especially when portfolios are frequently adjusted. One single market index is not sufficient to capture return variations of a portfolio (Gruber, 1996; Grinblatt and Titman, 1989; and Ferreira, Miguel, and Ramos, 2006). Fama and French (1992, 1993) propose a three-factor model to reduce CAPM pricing errors by adding size and book-to-market risk factors. Carhart (1997) demonstrates that a momentum factor (Jegadeesh and Titman, 1993) should be included in addition to the market index, size, and book-to-market factors. The four-factor model is given by:

$$R_{it} = \alpha + \beta_{0i} RM_t + \beta_{1i} SMB_t + \beta_{2i} HML_t + \beta_{3i} MOM_t + \varepsilon_{it} \quad (1)$$

where R_{it} is stock return in U.S. dollar in excess of one-month U.S. Treasury bill rate in month *t*. We follow the conventional method in Fama and French's studies (1992, 1993) to construct size (*SMB*) and book-to-market (*HML*) factor. *SMB* is the average return on the small-capitalization portfolio minus the average return on the large-capitalization portfolio; *HML* is the difference in returns between the portfolio with high book-to-market stocks and the portfolio with low book-to-market stocks. We construct monthly benchmark factors for each individual country using all stocks included in the Datastream/Worldscope database. Domestic market return *RM* is computed using value-weighted average returns in U.S. dollar of all stocks in each country in each month.

We compute momentum factor for month *t* using six value-weighted portfolios formed at the end of month *t-1*. These six portfolios are formed on the intersections of two portfolios formed on size and three portfolios formed on prior six months' (escaping the most recent month) cumulative returns. We use the median market equity at month *t-1* in each country as breakpoint for the size portfolios. We use the 30^{th} and 70^{th} percentiles of prior cumulative returns in each country as breakpoints for the prior return portfolios. The bottom 30% are classified as losers portfolio, the middle 40% as medium, and the top 30% as winners portfolio. MOM factor is computed as the monthly average return on the two winners portfolios minus the monthly average return on the two losers portfolios:

$$MOM = (Small\ Winnners + Big\ Winners - Small\ Losers - Big\ Losers)/2 \quad (2)$$

Idiosyncratic risk can be measured as the standard deviation of unexpected return innovations. It is usually calculated as the standard deviation of regression residuals from a pricing model (Ang, Hodrick, Xing, and Zhang, 2006 and 2009). Previous studies normally use Ordinary Least Square (OLS) model to calculate realized idiosyncratic volatility. However, Fu (2009) argues that past-realized idiosyncratic volatility is not an appropriate proxy for expected idiosyncratic risk, because idiosyncratic volatility of a typical stock does not follow a random walk. Fu (2009) proposes an Exponential GARCH (EGARCH) model to capture the time-variation of expected idiosyncratic risk. EGARCH model is also able to capture asymmetric effects of volatility. We apply EGARCH (p,q) on individual stock's monthly returns to estimate conditional idiosyncratic volatility of the following month via:

$$R_{it} = \alpha + \beta_{0i}RM_t + \beta_{1i}SMB_t + \beta_{2i}HML_t + \beta_{3i}MOM_t + \varepsilon_{it}, \qquad \varepsilon_{it} \sim N\left(0, \sigma_{it}^2\right) \tag{3}$$

$$ln\sigma_{it}^2 = a_i + \sum_{l=1}^{p} b_{i,l} ln\sigma_{i,b-1}^2 + \sum_{l=1}^{q} c_{i,k}\left\{\theta\left(\frac{\varepsilon_{i,t-k}}{\sigma_{i,t-k}}\right) + \gamma\left[\left|\frac{\varepsilon_{i,t-k}}{\sigma_{i,t-k}}\right| - (2/\pi)^{1/2}\right]\right\} \tag{4}$$

We describe the monthly return process using the Fama-French model. Model residual ε_{it} has a standard normal distribution with mean of zero and variance of σ_{it}^2, conditional on the information set at time *t-1*. Variance σ_{it}^2 is a function of the past p-period residual variances and q-period return shocks as specified by the second equation. At the beginning of each month during the holding period, we calculate each stock's conditional idiosyncratic volatility by estimating an EGARCH (1,1) model.

RESULTS

Table 1 reports average monthly returns of the zero-cost strategy and corresponding p values for the entire time period of this study. We report average monthly returns for each individual country and pooled averages for developed and emerging countries. As shown in Table 1, our results are consistent with existing evidence in ten countries, including U.S., that firms with lower accruals earn significant higher returns (Except for Luxembourg). The magnitude of monthly abnormal returns varies dramatically across countries. Abnormal returns vary from 0.58% (Denmark) to 2.16% (U.S.). We also report average abnormal returns for developed and emerging countries. Abnormal returns do not exhibit significant difference between developed and emerging countries.

Table 1: Summary Statistics of Abnormal Returns of Zero-cost Portfolios by Country

Developed Country	Monthly Return (%)	P-Value	Emerging Country	Monthly Return (%)	P-Value
Australia	-0.08	0.85	Argentina	0.95	0.29
Austria	0.44	0.45	Chile	0.01	0.99
Belgium	**0.82**	**0.10**	China	**0.74**	**0.04**
Canada	0.59	0.15	Egypt	0.47	0.66
Denmark	**0.58**	**0.05**	Hungary	-1.15	0.31
Finland	0.11	0.76	India	0.42	0.22
France	0.47	0.16	Indonesia	0.16	0.85
Germany	**0.93**	**0.00**	Malaysia	0.09	0.91
Greece	0.44	0.71	Mexico	-0.73	0.30
Hong Kong	**1.08**	**0.02**	Pakistan	0.40	0.57
Ireland	-0.47	0.57	Peru	1.42	0.19
Israel	0.07	0.90	Philippines	-0.02	0.97
Italy	**1.10**	**0.01**	Poland	**1.24**	**0.10**
Japan	0.11	0.61	South Africa	**1.00**	**0.05**
Luxembourg	**-2.65**	**0.07**	Thailand	**1.31**	**0.00**
Netherlands	-0.33	0.52	Turkey	0.19	0.88
New Zealand	0.45	0.36	emerging	**0.346**	**0.078**
Norway	0.41	0.29			
Portugal	0.64	0.19			
Singapore	0.24	0.49			
South Korea	0.43	0.38			
Spain	0.24	0.83			
Sweden	0.11	0.76			
Switzerland	0.16	0.52			
Taiwan	0.33	0.35			
United Kingdom	-0.15	0.79			
United States	**2.16**	**0.08**			
developed	**0.327**	**0.001**			

This table presents mean values of monthly abnormal returns from the zero-cost strategy for accrual anomaly. p-value is from t-statistics adjusting for heteroscedasticity and autocorrelations. Data significant at 10% level are highlighted. The sample period is 1989-2009.

We summarize our results on risk-adjusted abnormal returns from the Fama-French model in Table 2. Table 2 shows abnormal returns obtained from the zero-cost strategy are not explained by Fama-French risk factors. Comparing Table 2 to Table 1, in most countries including U.S., abnormal returns remain present after adjusting for Fama-French factors.

Table 2: Risk-adjusted Abnormal Returns on Accrual Anomaly for Different Countries

Developed Country	α	t-value	Emerging Country	α	t-value
Australia	-0.002	-0.485	Argentina	0.012	1.324
Austria	0.005	0.843	Chile	-0.002	-0.579
Belgium	**0.009***	**1.831**	China	**0.007***	**1.843**
Canada	0.002	0.484	Egypt	**0.017***	**1.801**
Denmark	**0.007****	**2.314**	Hungary	-0.009	-0.765
France	0.005	1.501	India	0.005	1.452
Finland	-0.003	-0.746	Indonesia	0.004	0.446
Germany	**0.009*****	**3.057**	Malaysia	0.003	0.332
Greece	**0.015**	**2.005**	Mexico	-0.010	-1.388
Hong Kong	**0.008***	**1.879**	Pakistan	-0.002	-0.318
Ireland	-0.005	-0.566	Peru	0.017	1.490
Israel	0.000	0.079	Philippines	-0.001	-0.082
Italy	**0.013*****	**3.122**	**Poland**	**0.015***	**1.816**
Japan	0.001	0.283	**South Africa**	**0.009***	**1.681**
Luxembourg	-0.015	-1.001	Thailand	0.006	1.374
Netherlands	-0.003	-0.597	Turkey	0.001	0.057
New Zealand	0.005	0.969			
Norway	0.006	1.398			
Portugal	0.006	1.236			
Singapore	0.004	1.114			
South Korea	**0.010****	**2.050**			
Spain	0.002	0.202			
Sweden	0.002	0.480			
Switzerland	0.001	0.433			
Taiwan	0.003	0.890			
United Kingdom	-0.002	-0.267			
United States	**0.060****	**2.149**			

*This table summarizes significant abnormal returns and t-values adjusted for Fama-French and Momentum factors. Highlighted data are the returns significant are 10% level. The sample period is 1989-2009. *, **, *** represents significance level at 10%, 5%, and 1%, respectively.*

In addition to examining individual countries, we also conduct risk-adjusted factor regressions for developed and emerging countries. Results are summarized in Table 3. We report α's for portfolios in the first quintile (Low), the medium quintile (3), and the fifth quintile (High) based on ranking of accrual anomaly for both developed and emerging countries. We also report α's from the zero-cost portfolios (L-H). As shown in Table 3, abnormal returns (L-H) is significant for both developed and emerging countries. Similar to the zero-cost strategy (without risk adjustment), developed and emerging countries have similar abnormal returns.

Table 3: Risk-adjusted Abnormal Returns of Accrual Anomaly in Developed and Emerging Countries

	High	3	Low	L-H
		Fama-French alphas		
Developed	-0.034	0.108	0.295***	0.357***
	(-0.287)	(1.086)	(2.493)	(3.54)
Emerging	-0.808***	-0.822***	-0.482*	0.433**
	(-3.431)	(-3.359)	(-1.935)	(2.092)

*This table reports risk-adjusted abnormal returns of accrual anomaly in developed and emerging countries using Fama-French model. We report results of quintile 5 (Low), 3, 1 (High) and High-minus-low (L-H) and corresponding t values (in parentheses). T-statistics are adjusted for heteroskedasticity. *, **, *** represents significance level at 10%, 5%, and 1%, respectively.*

Our risk-adjusted results indicate that holding portfolios formed on accrual anomaly produces significant abnormal returns and these abnormal returns cannot be driven away by well-established Fama-French risk factors. These abnormal returns appear at individual country level, and in both developed and emerging economies. We further investigate if idiosyncratic risk can explain the existence of abnormal returns. Studies have suggested that limits of arbitrage, inadequacies of underlying asset-pricing model, missing risk factors, information uncertainty, investor irrational behaviors, and data snooping could result in an anomaly. In recent years, in contrast to risk-based explanations, behavioral finance commonly interprets anomalies as evidence of mispricing and market inefficiency. Under the framework of behavioral finance, researchers typically examine investment choices of rational and irrational investors. Because of high costs (limits of arbitrage), rational investors do not fully offset the choices of irrational investors, so mispricing remains. We hypothesize that abnormal returns associated with these anomalies will be greater among high idiosyncratic risk stocks and smaller among low idiosyncratic risk stocks if idiosyncratic risk does prevent arbitrageurs from offsetting choices of irrational investors.

To examine the relationship between abnormal returns and idiosyncratic risk, we sort stocks into quintiles based on rankings on idiosyncratic risk and accrual anomaly, independently. We then form 5x5 portfolios using intersections of the five idiosyncratic risk quintiles and five quintiles for each anomaly. We present equal-weighted monthly returns of these 25 portfolios in Table 4. In this table, I1 to I5 represent ranks of idiosyncratic risk from low to high. A1 to A5 stand for the ranks of accrual anomaly. The difference between A1 and A5 (A1-A5) is the abnormal return at each idiosyncratic risk level. We report results for both developed and emerging countries.

Table 4: Monthly Returns of Portfolios formed on the Interactions Between Idiosyncratic Risk and Accrual Anomaly

Country		A1	A2	A3	A4	A5	A1-A5
Developed	I1-Low	0.824***	0.619***	0.514**	0.733***	0.671***	0.153
		(4.28)	(3.352)	(1.966)	(3.656)	(3.233)	(0.623)
	2	0.693***	0.768***	0.952***	0.732***	0.934***	-0.241
		(3.838)	(4.316)	(5.518)	(4.445)	(4.666)	(-1.138)
	3	1.061***	1.067***	1.151***	1.265***	0.966***	0.094
		(6.941)	(7.956)	(8.363)	(8.941)	(6.883)	(0.647)
	4	2.111***	1.925***	1.757***	2.044***	1.682***	0.428***
		(11.912)	(11.72)	(10.958)	(11.976)	(9.506)	(2.568)
	I5-High	4.166***	4.152***	3.807***	3.564***	3.874***	0.291
		(14.782)	(13.138)	(13.492)	(13.224)	(13.219)	(0.964)
Emerging	I1-Low	0.669**	0.276	0.826**	0.675**	0.849***	-0.18
		(2.605)	(1.01)	(2.119)	(2.187)	(2.635)	(-0.522)
	2	0.997***	0.811***	1.068***	0.779***	0.764***	0.233
		(3.668)	(3.079)	(3.614)	(2.761)	(2.788)	(0.872)
	3	1.015***	1.568***	1.311***	1.599***	0.982***	0.033
		(3.61)	(5.635)	(4.68)	(5.602)	(3.48)	(0.122)
	4	2.43***	2.171***	2.604***	2.114***	2.078***	0.352
		(7.309)	(6.808)	(7.244)	(6.737)	(5.197)	(0.912)
	I5-High	4.971***	5.122***	5.173***	4.284***	4.53***	0.441
		(9.017)	(9.531)	(9.591)	(8.143)	(8.798)	(0.765)

*This table presents monthly returns of portfolios formed on intersections between idiosyncratic risk and accrual anomaly. I1-I5 represent the rank of idiosyncratic risk from low to high. A1 to A5 stand for the rank of accrual anomaly. The difference between A1 and A5 (A1-A5) is the abnormal return at each idiosyncratic risk level. T-statistics are reported in parenthesis. *, **, *** represents significance level at 10%, 5%, and 1%, respectively.*

Table 4 shows a strong positive correlation between abnormal returns and idiosyncratic risk. We find stocks with higher idiosyncratic risk usually have higher abnormal returns than stocks with lower idiosyncratic risk. For instance, in developed countries, the abnormal return for low idiosyncratic risk stock is 0.153%, while abnormal returns are 0.428% and 0.291% for high idiosyncratic risk stocks. This pattern is also present in emerging countries (-0.18% for low idiosyncratic risk stocks and 0.441% for high idiosyncratic risk stocks). It is consistent with the limits of arbitrage theory, because risk-averse arbitrageurs are more likely to eliminate abnormal returns for stocks with low idiosyncratic risk at a lower cost, but they fail to do so for stocks with high idiosyncratic risk due to higher costs.

We perform panel regression analysis cross-country over our testing time period to further explore mispricing explanations. We test three hypotheses based on the mispricing explanation: 1) idiosyncratic risk and abnormal return are positively correlated at portfolio level (zero-cost portfolio), 2) developed countries have lower abnormal returns, and 3) the same level of idiosyncratic risk have lower impact on abnormal returns in developed countries compared to emerging countries. We use risk-adjusted monthly abnormal returns α from the Fama-French model as the dependent variable. Idiosyncratic risk and a number of country-level characteristics are used as independent variables. Since abnormal returns are computed as the monthly α's of the zero-cost portfolio, we define idiosyncratic risk of the zero-cost portfolio as the value-weighted average of the idiosyncratic risk of stocks with long-positions minus the value-weighted average of the idiosyncratic risk of stocks with short-positions in the zero-cost portfolio. We apply the following model:

$$AR_{jt} = \alpha_0 + \beta_1 Idovol\_P_{jt} + \beta_2 Economy + \beta_3 Economy * Idvol\_P_{jt} + F_j\gamma_1 + A_{jy}\gamma_2 + M_{jt}\gamma_3 + \varepsilon_{it} \quad (5)$$

where AR_{jt} is the risk-adjusted abnormal return α from Fama-French model in country *j* in month *t*. $Idovol\_P_{jt}$ is the idiosyncratic risk of zero-cost portfolio in country *j* in month *t*. *Economy* is a dummy variable (1 for developed countries and 0 for emerging countries). While F_j is a vector of country characteristics that are constant over time, A_{jy} and M_{jt} are vectors of country characteristics that are updated annually and monthly, respectively. ε_{it} is an error term. Appendix A provides information on these country characteristic variables. We use panel regression with country and year fixed effect to estimate the model. Table 5 reports parameter estimates and *p*-values.

Table 5: Regression Analyses for Abnormal Returns on Idiosyncratic Risk and Country Characteristics across Countries

	M1	**M2**	**M3**
Intercept	0.002	-0.01	-0.004
	(0.082)	(-0.423)	(-0.171)
Idiovol_Pjt	0.089**	0.089**	0.172**
	(2.137)	(2.134)	(2.006)
Economy*Idiovol_Pjt			-0.151*
			(-1.74)
GDPC	-0.001	0	0
	(-0.783)	(-0.052)	(-0.195)
Mcap	-0.002	-0.002	-0.002
	(-1.029)	(-0.792)	(-0.788)
FDI	0	0	0
	(-0.098)	(-0.105)	(0.08)
Antiself	-0.01*	-0.01	-0.008
	(-1.74)	(-1.605)	(-1.372)
Dreq	-0.005	-0.003	-0.004
	(-0.434)	(-0.301)	(-0.378)
Ftran	0.002	0.002	0.002
	(0.644)	(0.641)	(0.716)
GDPg	-0.007	-0.009	-0.019
	(-0.125)	(-0.174)	(-0.35)
ImpEquity	0.039*	0.034	0.031
	(1.921)	(1.592)	(1.495)
AcStd	0.021	0.021	0.018
	(1.555)	(1.62)	(1.375)
Economy		-0.004	-0.003
		(-0.94)	(-0.759)

*Monthly risk-adjusted abnormal returns are regressed on portfolio idiosyncratic risk and country level explanatory variables using panel regression with year and country fixed effect. Idiovol_Pjt is the portfolio idiosyncratic risk. Economy is a dummy variable with value of 1 if a country is defined as developed economy, 0 for emerging economy. Definitions of other variables can be found in Appendix A. *, **, *** represents significance level at 10%, 5%, and 1%, respectively.*

We test three models. Model 1 (M1) is the base model that examines the positive correlation between idiosyncratic risk and abnormal returns. Model 2 (M2) tests if abnormal return is different between developed and emerging countries using the dummy variable $Economy$. Model 3 (M3) tests if idiosyncratic risk has a different impact on abnormal returns between developed and emerging countries using the interaction term ($Economy * Idvol\_P_{jt}$). Under mispricing hypothesis, we expect to have a significant positive coefficient for $Idovol\_P_{jt}$ and significant negative coefficients for both the dummy ($Economy$) and interactive term ($Economy * Idvol\_P_{jt}$).

There are several interesting observations in Table 5. First, we observe a strong positive correlation between abnormal returns and idiosyncratic risk ($Idovol\_P_{jt}$) for all three models. The positive effect of idiosyncratic risk on abnormal returns is consistent with findings from previous section. It not only confirms that idiosyncratic risk is an important factor attributing to the existence of anomalies, but also shows that the effect is persistent across countries and over time. In addition, this positive correlation remains significant after we control for various country characteristics. Second, we find that the dummy variable $Economy$ has a negative coefficient but is not significant.

Although literature suggest country characteristics (such as governance quality, investor protection, and accounting standards) have an impact on abnormal returns under mispricing hypothesis, our results do not provide strong support to it. Finally, Table 5 presents strong evidence that the same level of idiosyncratic risk produces lower abnormal returns in developed countries. The coefficients of the interaction term $Economy * Idvol\_P_{jt}$ are negative at 10% level. Developed countries in general have better governance and stronger investor protection that allow rational investors to drive away arbitrage opportunities at lower costs and to take more aggressive positions to offset misprcing than investors in emerging countries. Our results support this hypothesis. Overall, we find idiosyncratic risk is an important factor contributing to the existence of accrual anomaly. It has significantly different impact on abnormal returns between developed and emerging countries. Our results are consistent with mispricing theory.

CONCLUDING COMMENTS

In this study, we investigate accrual anomaly in capital markets around the world. We use zero-cost trading strategy and Fama-French factor model to show that accrual anomaly produces significant abnormal returns across countries, and there are significant variations among countries. After presenting the evidence that accrual anomaly exists in international markets, we examine if it can be explained by idiosyncratic risk. Using a portfolio approach, we document a strong positive correlation between abnormal return and idiosyncratic risk. These results provide strong evidence to support limits of arbitrage theory across countries. Using cross-country regression analysis, we provide robust results to further support limits of arbitrage theory. We document a positive correlation between idiosyncratic risk and abnormal return after controlling for country characteristics.

Moreover, evidence suggests that the impact of idiosyncratic risk on abnormal return in developed countries is significantly weaker than the impact in emerging countries. Our results support the mispricing explanation of the existence of accrual anomaly around the world. We acknowledge that there are numerous studies covering many aspects of accrual anomaly in the literature. Our study only covers a small spectrum of it. For instance, we are not trying to identify if accrual anomaly is persistent over time nor how abnormal returns are influenced by other factors, such as transaction costs, etc. These issues can be examined in future studies.

APPENDIX A

Variables	Acronym	Description and Source of Information
GDP Per Capita	*GDPC*	Log of per capita GDP measured in US dollar in year t-1. (WDI)
Stock Market Cap to GDP	*Mcap*	Ratio of stock market capitalization to GDP in year t-1. (WDI)
Inportance of Equity Market	*ImpEquity*	The mean rank of a country across three variables (ratio of aggregated stock market capitalization held by minorities to GNP, number of listed domestic firms relative to the population, and number of IPOs relative to the population) with higher scores indicating greater importance of the stock market. (La Porta et al. 1997)
Developed/Emerging Economies	*Economy*	World Bank's classification scheme (2005).
GDP Growth	*GDPg*	Annual GDP growth in year t-1. (WDI)
FDI to GDP	*FDI*	Ratio of the sum of absolute values of FDI inflows and outflows with U.S. to GDP in year t-1. (WDI)
Financial Transparency Factor	*Ftran*	Measure of intensity and timeliness of financial disclosures by firms, and interpretation and dissemination of firms' news. (Bushman et al., 2004)
Disclosure Requirements Index	*Dreq*	The score that measures disclosure requirement for a country. (La Porta et al., 2006)
Accounting Standard Index	*AcStd*	It examines and rates companies' 1990 annual reports on 90 items for 36 countries, covering general information, income statements, balance sheets, fund flow statements, accounting standards, and stock data. (La Porta et al., 1998)
Anti-Self-Dealing Index	*Antiself*	It focuses on a country's disclosure quality, approval, and litigation governing. (Djankov et al., 2008)

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