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DISSERTATION

ACCRUAL MISPRICING: AN ARBITRAGE OPPORTUNITY ON EUROPEAN EQUITY MARKETS?

CARLOS ANDRÉ PITA DE OLIVAL OSÓRIO LÉLIS

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SUPERVISION:

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Abstract

Contradicting market efficiency hypothesis, Sloan (1996) seminal work shows us that there is a negative relation between accounting accruals and future stock returns. Since then, a stream of literature has been written on why this anomaly occurs and in which markets it manifests.

In one particular study by Mashruwala *et al* (2006), evidence is found that the reason for the existence of the anomaly is attributed to transaction costs and idiosyncratic risk.

While the anomaly has been found globally, most of explanations have been focused on the US market. With this study, by following the same methodology as previous authors, we will try to test the same results as the ones documented by Mashruwala *et al* (2006), on the European setting and updated it for the last 10 years. Furthermore, and consequently, we will assess the impact of the recent crisis on the anomaly.

We found no statistical evidence that the accrual anomaly still exists on the European markets. Possible explanation can be given to the fact that transaction costs and idiosyncratic risk are no longer a barrier for investors.

Key-words: Accruals Anomaly, Earnings, Idiosyncratic risk, Transaction costs, Arbitrage, European Crisis

Resumo

Contradizendo a hipótese de eficiência de mercado, o trabalho seminal de Sloan (1996) mostrou-nos que existe uma relação negativa entre os *Accruals* contabilísticos e os retornos futuros de ações. Desde então, muita literatura foi escrita sobre a razão para esta anomalia ocorrer e em que mercados se manifesta.

Num estudo particular, de Mashruwala et al (2006), verifica-se que o motivo da existência da anomalia é atribuído aos custos de transação e ao risco idiossincrático.

Embora a anomalia já tenha sido provada globalmente, a maioria das explicações focou-se principalmente no mercado dos EUA. Com este estudo, e seguindo a mesma metodologia que os autores anteriores, tentámos testar os mesmos resultados que os documentados por Mashruwala *et al* (2006), agora no cenário Europeu e atualizado para os últimos 10 anos. Desta forma, também será avaliado o impacto da recente crise na anomalia.

Não encontramos evidências estatística recente da existência da anomalia nos mercados Europeus. Uma possível explicação pode ser atribuída ao facto de que os custos de transação e o risco idiossincrático já não constituirem uma barreira para os investidores.

Palavras-chave: Anomalia de *Accruals*, Resultados, Risco idiossincrático, Custos de transacção, Arbitragem, Crise Europeia

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I would like to express my sincere gratitude to my supervisor for taking me under his wing even though I was far off from his model student. His guidance was a must not only for the conclusion of the work but specially for the start of it.

A very special thanks to my parents and family that gave me the opportunity to invest in a higher education.

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1. Introduction

In financial literature, capital market efficiency shows that prices reflect, in an almost instantaneous manner, all publicly available information (Fama, 1990). Contrary to this belief, on his seminal work, Sloan (1996) documented that investors fail to fully recognize the impact of accounting accruals when forming earnings expectations.

Years later, Mashruwala *et al* (2006) tries to respond to a very pertinent question – Why this accrual anomaly still exists? Why hasn't it been corrected through arbitrage trading. Their research suggested that there were constraints that made exploiting it cost-ineffective. The author suggested that high idiosyncratic risk and trading costs chased away risk averse arbitrageurs giving prevalence to the anomaly.

Our paper will follow the same line of the previous authors. However, while they focused on the US market, we will swift our focus to the European market. The presence of the anomaly in Europe has been proved by other authors (Pincus *et al*, 2007, Papanastasopoulos, 2014) but we will update the research to a more contemporaneous setting. Since Mashruwala *et al* (2006) publication, global financial markets have experienced turbulent times, so it will be of interest to see the impact of the recent crisis on the anomaly.

We find no evidence that the accrual anomaly persists on European markets. The study shows that, contrary to previous research, investors are not underweighting the accrual component of earnings. We also fail to notice any predictive power on accruals in regard to future stock returns.

Our results point toward a possible new outcome in investors behaviour during crisis. Economically, given the lower returns that can be obtained on today markets, it makes sense that investors may reduce their risk averse levels to get more returns.

Our paper is organized as following. Section 2 will present a literature review on the subject. Section 3 will then develop our hypotheses. Methodology and data will be described on section 4 and our empirical analysis on section 5. Finally, section 6 concludes our study.

2. Literature Review

Sloan (1996) demonstrated that firm, with a high accrual component of earnings, will fall short on their expected returns. The reverse also prevails, firms with a low accrual component of earnings, will experience higher expected returns.

Empirically, this negative relation between accruals and stock returns was exploited through a hedge trading strategy created by Sloan (1996). Every year, firms were ranked on deciles based on the magnitude of their accruals. By going long (short) in a portfolio consisting of the lowest (highest) decile of firms with low (high) accruals, it was possible to generate abnormal returns. Over a period of 30 years, 90% of the time, the hedge portfolio had positive returns one year after formation. Abnormal returns, adjusted for size, registered on average 10.4% (same value when computing Jensen's alpha). Lev & Nissim (2004) proved that the strategy also held for more recent times.

Sloan attributed this market anomaly to investors naïve fixation on earnings. Investors, failing to realize the low persistence of the accrual component of earnings, by overweighting the cashflow one, inflate their earnings expectations. To their surprise, stock returns don't match their forecasts.

2.1. Investors Sophistication

Developing on Sloan (1996), the research from Bradshaw *et al* (2001) tried to access if the naïve fixation could be generalized to sophisticated investors. In their sample, they chose financial intermediaries with published opinions, sell side stock analysts and independent auditors.

Bradshaw *et al* (2001) research design for this hypothesis is unequivocal. Regarding analysts, they predict that the difference between realized earnings and forecast earnings, should be negatively correlated with accruals. If the error approaches zero, then there is indication that analysts incorporate the accrual effect on their forecasts and are not publishing over-confident (or pessimistic) opinions.

With respect to auditors, Bradshaw *et al* (2001) built upon the evidence of Dechow *et al (*1995) that high accrual firms are more likely to be penalized by SEC over GAAP infringements. The author's underlying assumption considers that auditors should be in line with GAAP rules. Holding to this idea, then there should exist a positive association between modified opinions published by auditors and firms with high accruals. If high accrual firms don't have more modified audit opinions, then auditors are not consolidating the information of accruals.

Evidence shows that analysts forecasts do not fully incorporate the information from accruals, resulting in a forecast error, for high accrual firms, of almost 20% of the reported earnings (Bradshaw *et al*, 2001). Furthermore, tests have shown that Auditors also do not issue more modified audit opinions for high accrual firms. The evidence found on the paper supports the naïve fixation hypothesis that sophisticated investors appear to not foresee the accrual issue.

2.2. Accrual Anomaly Globally

In a novel work, Pincus *et al* (2007) expanded the work of Sloan (1996) to the global scale. He proved that the accrual anomaly was not only present on the US equity markets, but also, in different degrees, in Australia, Canada, Denmark, France, Germany, Hong Kong, India, Indonesia, Italy, Japan, Malaysia, The Netherlands, Singapore, Spain, Sweden, Switzerland, Taiwan, Thailand, and United Kingdom.

Pincus *et al* (2007) also proposed a new explanation for the anomaly. The authors found out that several country level factors may be responsible for the misprice. In this case, countries with a Common-Law tradition, more extensive accrual accounting and lower concentration of share ownership, reported a higher magnitude of the anomaly.

Papanastasopoulos (2014) did his research on Europe until 2008 and found presence of the anomaly. Besides the country level factors purposed on Pincus et al (2007), the author shows evidence that cross-country differences in culture, equity-market setting, analysts' research output, investor protection, and ownership structure explain the variation in magnitude of the accrual anomaly.

2.3. Other Theories for the Existence of the Anomaly

Another strand of works binds the accrual anomaly to possible managerial manipulation. Deriving from Sloan (1996), higher degree of subjectivity exists in accruals, making net income less reliable as a measure of performance, favouring instead, cash flows from operations. It's this subjectivity that can be exploited by management to mislead investors.

Xie (2001) takes on the definition of "total accruals" and splits them into two components, a normal and a discretionary one. The latest can be gauged, using Jones (1991)'s model, as the residuals from the regression estimated normal accruals. Employing Mishkin (1983)'s test, previously introduced in finance literature by Sloan (1996), the author found that the market underestimated the persistence of accruals. Furthermore, the study suggests that the market tends to overprice abnormal accruals to a higher degree than normal ones and that the mispricing, reported on Sloan (1996), is mainly attributed to them.

Considering that normal accruals are associated with the normal way a business is conducted (changes in sales revenues, Capex, etc.), then abnormal accruals is associated with unusual business circumstances and earnings management. After controlling for unusual business (M&A, IPO etc.) the author concludes that evidence suggests possible managerial manipulation.

Khan (2005) presents us a new possible explanation for the accrual anomaly. In his paper, the author suggests that capital markets do not actually misprice accruals. Instead, the differences in risk, between high and low accrual portfolios, are the driver for the return discrepancy. This difference in risk was not being considered by the models previously used to test the anomaly.

Khan (2005) uses a more recent model in asset pricing literature to control risk. The four-factor model (ICAPM), based on Campbell & Vuolteenaho (2004), adds news about future expected dividends and news about expected returns to the traditional SMB and HML as risk factors. Pricing error tests reject CAPM, two-factor model as per Campbell & Vuolteenaho (2004) and the three-factor Fama & French (1993)'s model while approving the four-factor one.

Finally, Khan (2005) shows that the expected returns on high and low accrual portfolios are, on average, equal to the realized returns when risk adjusted with the 4-factor model. Adding to the results that returns are negatively correlated with risk of bankruptcy, it is suggested that the difference in risk is not caused by the accruals. Instead, accruals act as a proxy for documented financial and economic distress causes due to their correlation.

An alternative hypothesis was suggested in Zhang (2007). In this work, the author purposes that it is not the low persistence of the accruals that creates the anomaly, but instead, the firm's corporate growth information contained in them. The rationale behind it is that accruals measure changes in investment in working capital, which co-varies with growth attributes of the firm such as employee growth, capital expenditures, sales, etc. Therefore, the accrual anomaly should be more pronounced on firms were accruals co-vary more strongly with firms' growth attributes (the author uses employee growth as a proxy for this attributes). In the end, under the investment assumption of Zhang (2007), the research suggests that accruals predict future stock returns due to the information contained in them. Companies for which accruals are more (less) correlated with growth information have stronger (weaker) power to forecast expected returns.

Nevertheless, the question of why investment/growth is negatively related to future stock returns remains open.

Wu *et al* (2007) follows a similar path. On their research, the authors also interpret accruals as working capital investments, making possible to apply optimal investment theory. It is theorized that firms fine tune their investments to counter changes in the costs of capital. This can be easily explained by the inverse relation between NPVs and cost of capital (discount rates). If cost of capital decreases, then the NPV[1] of a project will be more profitable, resulting in more investment, thus driving up the level of accruals. On the other hand, higher costs of capital generate lower NPVs and consequently, diminished investment and accruals. Higher costs of capital also result in higher current returns (since stock prices increase). However, they also mean lower expected returns in the future. Therefore, it is stated that the predictive power of accruals, for stock returns, increases with the covariation of accruals with past and current returns. As a result, accruals are negatively correlated with future returns.

2.4. Accrual Measures

We should also refer to the extensive work on the different components of the accruals. Even though the common computation of accruals in accounting literature is to use information from the balance sheet and income statement (Dechow *et al*. 1995), many authors use diverse ways to dissect the accruals to find which one is the main driver for the anomaly.

[1] Net Present Value

Hirshleifer *et al* (2004) advocates net operating assets as a more reliable measure. On the other hand, Bradshaw *et al* (2001) adopts the stance that working capital accruals have a higher contribution to the anomaly.

Thomas and Zhang (2002) show evidence that the prime mover of the accrual anomaly comes from changes in inventory.

Earlier we mentioned the definition of discretionary accruals by Xie (2001). In his research the author finds out that discretionary accruals are the component associated with unusual business circumstances and earnings management. This suggest that there is room for possible earning manipulation.

Richardson *et al* (2005) goes further and suggests that there are other categories of accruals, not include in the Sloan's definition, that not only contribute for the anomaly but may provide more powerful tests. These are accruals related to non-current operating assets accruals, non-current operating liabilities, financial assets and financial liabilities.

2.5. Barriers to Arbitrage

In another important contribution for the literature, Mashruwala *et al* (2006) asks a very relevant question. If this accrual anomaly is well documented, why it has not been arbitraged away? The hypothesis given by the authors suggest that arbitrage barriers such as arbitrage risk and transaction costs (Wurgler & Zhuravskaya [2002], Pontiff [1996]) prevent the market from correcting the anomaly.

Consistent with Markowitz (1952) work, idiosyncratic risk can only be reduced through diversification. By definition, the most diversified portfolio (market) as zero idiosyncratic risk and zero abnormal return. Its implicit that, for an investor to gain abnormal returns, he cannot be fully diversified. Meaning, an arbitrageur can only achieve abnormal return if he is exposed to idiosyncratic risk. Literature also defines arbitrage as risk free strategy, making an arbitrageur risk adverse (Pontiff [1996]). Quoting Pontiff (1996, pp. 1139), *"If the arbitrageur cannot perfectly hedge the fundamental value of the arbitrage position, then arbitrage involves risk".* It is this unhedgeable portion of idiosyncratic risk that, according to Mashruwala *et al* (2006), prevents arbitrageurs from taking positions on the hedge portfolio strategy.

Research shows that (1) the accrual anomaly is concentrated in firms with high arbitrage risk (due to lack of close substitutes), making a hedge strategy of long (short) positions in low (high) accruals risky for risk averse arbitrageurs and (2) the accrual anomaly is centred around stocks with low prices and low volumes (proxy for high transaction costs) preventing further exploit of the misprice.

2.6. European Sovereign Debt Crisis

Given the period of our data sample, it is of utmost interest to address the influence of the European debt crisis on our research.

The beginning of the European Sovereign debt crisis is difficult to pinpoint. Given the necessity to select a period, for comparison reasons, we will mark the start of the crisis *circa* October 2009. This date is selected considering the occurrence of an important market event, Greece revised their 2009 budget deficit forecast, resulting in more than double of the previous estimate (from 6% to 12.7% of GDP, Lane (2012)).

We will also select another market event to mark the end of the crisis peak. The announcement, in September 2012, that the ECB would provide free unlimited support for all eurozone countries involved (Lane, 2012).

The period selected matches the spread expansion, and then contraction, of long term yields from all European sovereign bonds (Lane (2012) and Arghyrou and Kontonikas, 2012).

According to Shambaugh (2012), the European crisis can be split into three "smaller" crises that are interconnected. It first started with a Banking Crisis. Since 2007-2009 banks were undercapitalized and faced liquidity issues. To avoid financial contagion, there were mass bailouts of weaker banks. Consequently, the bailouts lead to more indebted countries, especially in the European periphery, causing a sharp increase in their debt to GDP ratio. This is where it starts our "pure" Sovereign Debt Crisis.

To further aggravate the problem, with weaker banks there is a reduction in lending and therefore, a lack of growth unequally distributed across countries. A growth problem made indebted countries insolvent and thus resulting in a Growth Crisis. In addition, it is important to remind that by switching off the option for national currency, and with no fiscal union across nations, the tools to solve the crisis are gone at national level making countries merely spectators to all that was unfolding in from of them.

Important to our research is the analogous work of Ben-David *et al (*2011) done on the Financial Crisis of 2007-2009. According to his work, there was on average a retreat of 30% of equity holding from hedge funds on Q3 and Q4 of 2008 (Ben-David *et al,* 2011). Shleifer and Vishny (1997) attribute this exodus to theories suggesting that limits-to-arbitrage can emerge at times of market distress. This is a crucial point on our analysis since it makes a bridge for the reoccurring theme on this paper, that barriers to arbitrage can be an explanation for the presence of the accrual anomaly in the markets (Mashruwala *et al*., 2006).

3. Research Hypotheses

We aim to replicate Sloan (2006) tests on the anomaly for the euro-zone.

H1(i): *Investors tend to underestimate the accrual component of Earnings and overweight the cashflow one.*

Following this premise, then there should be a way to explore this market gap. Next, we will create a hedged position exposing only the anomaly component to market fluctuation, hence:

H1(ii)*:* *It's possible to generate positive abnormal returns by taking, simultaneously, long(short) positions on a portfolio composed of the companies with a relative low(high) level of accruals.*

Furthermore, this suggests that accruals may have explanatory power for future stock returns. Then our third component of hypothesis 1 is:

H1(iii): *There is a negative relation between accruals and future stock returns in the European market.*

The possibility of acquiring positive abnormal returns creates a hole in the efficient market rationality. According to Mashruwala *et al* (2006), there must exist some barriers to arbitrage that justify the anomaly. We will study the same barriers proposed by their research on our next hypothesis:

H2: *Idiosyncratic risk and Transaction costs are barriers to arbitrage.*

Finally, this paper provides an original contribution to the literature, to the best of my knowledge, by framing the accrual anomaly during the European Debt crisis setting.

The purpose is to expand the premise behind Mashrwala *et al* (2006) thesis. It follows that: if arbitrageurs cannot exploit the mispricing due to transaction costs and idiosyncratic risk, then during a period of finance distress, where the market has higher transaction and is more volatile (Chordia *et al* (2005)), the accrual anomaly should be more severe. Quoting Ben-David *et al* (2011), pp. 1, "Hedge funds are the investor class that most closely resemble textbook arbitrageurs", so their potential to arbitrage is likely to be more limited during market crises. Hence:

H3: *The accrual anomaly is possibly bigger in magnitude during a crisis period given higher idiosyncratic risk and higher transaction costs.*

This final test will be done by focusing the previous three hypotheses on the specific time frame of the European Debt crisis.

Consequently, it is expected that our variables, i.e. the magnitude of the accruals; the proxy for idiosyncratic risk; the transaction costs and the alpha generated by the strategy to be higher than the average results derived from the extended period.

If verified, then the role of transaction costs and idiosyncratic risk, can be further solidified as a major reason for the existence of the anomaly.

4. Data and Methodology

Our empirical testing is conducted using retrieved data from *Amadeus Database*. We consider all financial statement and market data from public listed firms in the European Union 15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom), for a 11-year period 2005 to 2016. Due to the hardship of interpreting accounting information required for our tests, we will exclude the following NACE Rev 2 codes from our sample: *K – Financial and Insurance activities*, *O – Public Administration and defence* and *U – Activities of Extra Territorial Organizations and Bodies*. We also eliminate any firm-year without enough data to compute the financial variables required for the analysis. In the end, we are left with a sample of 15,734 firm-year observations.

We will start by measuring accruals using Sloan's (1996) and Dechow *et al*. (1995) methods:

$$Accruals = (\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD - \Delta TP) - Dep \qquad (1)$$

Where:

$\Delta CA = change\ in\ current\ assets$
$\Delta Cash = change\ in\ cash/cash\ equivalents$
$\Delta CL = change\ in\ current\ liabilites$
$\Delta STD = change\ in\ debt\ included\ in\ current\ liabilites$
$\Delta TP = change\ in\ income\ taxes\ payable$
$Dep = Depreciations\ and\ amotization$

To more easily compare the relative magnitude of the earning components, we standardize our variables by firm size. The measure of firm size is the average of the beginning and end of year book value of total assets.

The Cash Component of earnings is therefore the difference between Earnings and Accruals. Hence, we have the definition of our first three financial variables:

$$Earnings = \frac{EBIT}{Average\ Total\ Assets} \tag{3}$$

$$Accrual\ Component = \frac{Accruals}{Average\ Total\ Assets} \tag{4}$$

$$Cash\ Flow\ Component = Earnings - Accrual\ Component \tag{5}$$

After computing our variables, we will then, for each year, rank the firms based on accruals and assigned them to equally weighted portfolio deciles. The ranking will be done at year end.

To access if decile portfolios generate abnormal returns, we will use the standard CAPM time series regressions for each portfolio to estimate Jensen's alpha.

$$(R_{pt} - R_{ft}) = \alpha_p + \beta_p(R_{mt} - R_{ft}) + \epsilon_{pt} \tag{6}$$

Where:

$R_{pt} = equally\ weighted\ monthly\ return\ on\ portfolio\ p\ in\ year\ t$
$R_{mt} = monthly\ market\ return\ in\ year\ t$
$R_{ft} = risk\ free\ rate\ in\ year\ t$

Pooled sample estimates of Jensen's alpha will be computed for the post ranking years 2010-2015. To ensure complete dissemination of the accounting information in financial statements, we will start our return computation period on 1st of April of the post ranking year instead of 31th of December. The portfolio beta coefficient is determined through a time series regression on the excess returns of the portfolio and the excess return on the market over the 10-year period. We will be using Germany 1-year Government bonds2 as proxy for our risk-free rate and quotations on the STOXX 600 index3 for our market return.

Finally, we will follow Mashruwala et al (2006) methodology to determine the proxies for Idiosyncratic risk and transactions costs. The Idiosyncratic risk of a portfolio will be estimated as the residual variance from the CAPM regression on the portfolio's returns and the STOXX 600 index returns over 36 months prior the ranking year (evaluation period). Given the period of our sample, the constraint of 36 months means that the first ranking year will be 2009. We will use Average Trading Volume (in shares) as a proxy for Transaction costs.

5. Empirical Analysis

As a means to test our hypothesis developed on section 3, we first start by providing descriptive statistics related to all components of earnings.

To avoid skewed results due to outliers, every year we chose to exclude 1% of the firms on each extreme of the sample based on the level of the accrual component[4]. After this exercise, we reduced our sample from 15,734 to 15,319 firm-years.

Each decile is an equally-weighted portfolio with statistics reported in Table I. Compatible with Sloan's research, on Panel A we can notice evidence on the negative relationship between Accruals and Cashflows. The Accrual component ranges from the lowest accrual portfolio at -0.2405 to its highest at 0.1228 while

[2] Data compiled from Tullett Prebon
[3] Data extracted from Reuters
[4] In untabulated results, we removed all firms with the average stock price inferior to EUR 1. The reason behind this action was to avoid having huge return swings coming from penny stocks. Nevertheless, this had residual impact and since it reduced our sample by more than one third, it was decided, to keep the penny stocks on our research.

the Cashflow component falls from 0.1828 to -0.0998 for the highest accrual portfolio. The mean value of Earnings grows from -0.0577 to 0.0230.

Panel B dissects the components of Accruals on the three variables already defined on section 4. While Sloan (1996) attributes the variation in accruals to the variation in Current Assets, on our data the relationship is not that obvious. The accrual variation can be attributable to both Current assets and Current Liabilities since both variables have a steady growth across the portfolios deciles. On the other hand, the steady fall on Depreciations seems consistent with Sloan (1996).

Panel C reports variables used for adjustment of risk. Portfolio Beta appears to show a "U-shaped" relationship with the extreme portfolios showing more risk. This is not as apparent as in Sloan (1996) since even though our highest accrual portfolio as an increase in risk when compared with the portfolios coming immediately before, it never raised to the level of the lowest accrual portfolio. The other variable used is Size, measured as the natural log the market value of common equity (in millions of euros). We can notice an "Inverted U-shaped" figure, this indicated that the riskier stocks are concentrated on the smaller firms.

Finally, we report in Panel D two variables suggested in Mashruwala *et al* (2006). Recall from our hypothesis that transaction costs and idiosyncratic risk are possible justifications for the existence of the anomaly.

Volume will be our proxy for transaction costs, defined as number of shares traded, averaged over one year, ending one month prior to April 1 of the post-ranking year.

For idiosyncratic risk we will use the variable ARBRISK, computed as the standard deviation of the residuals from a market model that uses 36 monthly returns ending one month prior to April 1 of the post ranking year.

Results suggest the same as prior studies. Idiosyncratic risk is higher in the extreme portfolios with 0.13 on the lowest accrual portfolio and 0.12 on the highest one. The same is observed in Volume. There is a lower volume of shares traded on these extreme portfolios, 2.31 (1.91) for the lowest (highest) accrual decile, indicating higher transaction costs.

Our first hypothesis is based on the investors naïveté to place less weight on the accrual component of earnings and therefore, overweight the cashflow one. If this is true then there is a negative relationship between accruals and future stock returns, hence we can design a trading strategy that exploits this anomaly. Since prior studies suggest that time-series of earnings properties differ according to industry attributes (Lev 1983), we start first by assigning our sample to the first 2 digits of the NACE rev. 2 codes. The result is 17 assignee groups, corresponding to the designations of NACE rev 2 codes from A to S, through a 6-year time-series.

Panel A of Table II show us the average level of persistence of earnings. The estimate of alpha is 0.5983 (with a p-value of 0.000) being consistent with Sloan's (1996) research that earnings are mean reverting.

On Panel B we dissect the Earnings variable into Accruals and Cash Flows following the same regression as shown in Panel A. The definition of the anomaly dictates that the coefficient of Accruals should be lower than the coefficient of Cashflows. We do not find the same on our tests. Instead we notice that the coefficient of Accruals is 0.8661 (p-value of 0.000), which is much higher than the coefficient of Cash Flows of 0.5197 (p-value of 0.000). Our data suggests that investors are not overweighting cashflows but instead are giving more importance to the accrual component of earnings.

Our second test for hypothesis 1 consists on creating a trading strategy that exploits the anomaly while keeping the risk exposure reduced to zero to avoid any contamination of the abnormal returns.

The strategy is composed by taking a long position on the portfolio with the lowest accrual component and a short position on the portfolio with the higher accrual component. Recall that lower accrual firms, in an economic sense, should produce higher future returns. On the other hand, a company with too much accruals should not be able to generate enough cashflows to meet its business cycle.

Table III shows the average Jensen's Alpha (abnormal monthly return) obtained on a portfolio created at year-end based on the accrual component. The cumulative period starts on April 1st of the post ranking year and finished in March of the year after.

It was expected for the lowest (highest) accrual portfolio to generate the highest (lowest) alpha. Even though indeed the highest portfolio retrieved the lowest alpha, 0.0019 (p-value 0.5467) this should have been negative to be in line with prior research. The lowest portfolio retrieved 0.0049 (p-value 0.1883), showing no relevant excess return compared to others. We find no statistical evidence on our data that shows that the returns obtained on the extreme deciles were not purely sporadic. As a matter of fact, we find several statistical significance decile portfolios with higher returns than the one with the lowest accrual component.

The strategy devised returned a Jensen alpha with value 0.0031 (p-value 0.1183), and with a Beta very close to nil (0.02) showing the hedged position taken on the market.

On Figure 1 we can observe more closely the performance of the strategy on the years it was implemented. The year 2008[5] was the only year to report a significant return on the strategy. The mean return of the strategy from 2009 to 2014 is very close to zero.

Our results suggested that the accrual anomaly is not present on the period of analysis.

Figure 1 - Returns by Calendar Year to a Hedge Portfolio Long on the Lowest Accrual Decile and Short on the Highest Accrual Decile

The third test for hypothesis 1 serves as check the theory of the negative relation between future stock returns and accruals. As our results point on a different direction, these tests will also serve as a tighter analysis to the contrary view our data suggests.

[5] It was also the only year, in our data, to report a higher return on the lowest accrual portfolio and a negative return on the highest accrual portfolio.

On Panel A of Table IV we regress future stock returns, accumulated starting 4 months after the post-ranking year and finishing 1 year later, over the Industry level mean of the accrual component for the 6 years in analysis. We also perform the same regression but this time using the variables that constitute the accruals to capture their variations (Panel B). Like prior research, we find a negative coefficient on the independent variable. However, we cannot find any statistical significance for the coefficients.

Since we cannot reject the null hypothesis, our data suggests that accruals have no explanatory power with respect to future stock returns for the period in analysis. This follows in line with our test.

The second hypothesis introduces two new explanatory variables suggested by Mashruwala *et al* (2006) for the accrual anomaly. We expect ARBRISK to be high on extreme portfolios since this would increase the inability of risk averse arbitrageurs to perform the accrual strategy developed above. On the other hand, low Volume suggests higher transaction costs, hence more constraints for a proper strategy execution. According to Mashruwala *et al* (2006), we should find explanatory power on these variables when regressed against future stock returns.

On Table V we can see the coefficients of the regression on Accruals, extended to include those above-mentioned variables and Size (market cap) as a control variable.

Our data shows that, excluding Size and Volume, Accruals and ARBRISK have no statistical significance in explaining the model for future stock returns (null hypothesis cannot be rejected). This suggests that accruals don't predict future stock prices and ARBRISK doesn't decrease the ability to perform the accrual strategy. On the other hand, it may also indicate that accrual anomaly has been arbitraged away and that the constraints to arbitrage risk were accepted by investors.

Our final hypothesis consists in studying the previous hypothesis, this time, in light of the financial crisis.

We start by dividing our time series into two periods. The first period will be the sole year 2008. The period from 2009-2014 will cover the subsequent beginning and end of the peak of the crisis. For the sake of consistency, we will run all tests again on these two periods.

As we can observe on Table VI, Panel A, the data for both periods show that Earnings are mean reverting with alpha 0.4541 (p-value 0.0393) for 2008 and alpha of 0.6397 (p-value 0.000) for period 2009-2014. However, results on Panel B are revealing. We can see that on 2008 the weight given to accruals is almost the same as the weight for Cashflows (statistically significant at 10% for N=17). Furthermore, this weight increases drastically for 2009-2014, almost doubling with a coefficient for Accruals of 0.9186 and a coefficient of Cash Flows of 0.5130, both with a powerful t-statistic. One can suggest that, starting 2008, investors have increased the weight on Accruals and, since the beginning of the crisis, the weight given to them has surpassed the one given to Cash Flows.

Nevertheless, on Table VII for the year 2008 and Table VIII, for the 2009-2014 period, it is shown that Accruals have no predictable power on future stock returns.

Comparing Panel A with Panel B of Table IX, results of the future return model on the variables Accruals, ARBRISK, Size and Volume are presented.

While on Panel B we find no statistical significance for any of the variables, on Panel A we see that ARBRISK, Size and Volume explain the model at a 1% significance. We should note that 2008 is an ambiguous year between the Sub-prime crisis in the US and the beginning of the Sovereign debt crisis in Europe.

Consequently, it appears that since 2008 accruals have no longer the power to predict future stock prices. It also appears that the returns in 2009 can be attributed to idiosyncratic risk. Paired with our analysis that investors no longer overweight Cashflows but instead have inverted the balance in favour of accruals, there may be evidence that investors, faced with a more uncertain market with lower returns, have accepted the idiosyncratic risk associated with extreme accrual firms and arbitraged away the accrual anomaly. Further conclusion can be extended by conducting the same research in future periods.

6. Conclusions

Our paper investigates the presence of the accrual anomaly, first reported by Sloan (1996), on European markets for the last 10 years. It follows Mashruwala *et al* (2006) suggestion of idiosyncratic risk and transaction costs as the barriers for investors to not arbitrage away the anomaly.

We found no sufficient statistical evidence that, by isolating portfolios of stocks based on the magnitude of accruals, we can exploit the negative relation between accounting accruals and future stock returns and generate positive alpha investments. We also observe that from 2009 to 2014 this strategy returns, on average, an alpha very close to nil.

It should be noted that due to gaps on our database we had to exclude a very considerable number of firms from our study. This reduced our final sample on roughly 1/3 of our original data extract.

Finally, we cannot disregard the fact that our period of study may be simply an outlier case attributed to the crisis. Research of future years may unveil a conclusion on this.

Nevertheless, our results also point toward a possible new outcome in investors behaviour during crisis. Economically, given the lower returns that can be obtained on today markets, it makes sense that investors may reduce their risk averse levels to get more returns. This could explain that even though we found higher values of ARBRISK (idiosyncratic risk proxy) and Volume (transaction costs proxy) the anomaly is no longer observed. Specially after we noticed that these proxies had a very high explanatory power on the year 2008 and this effect disappeared completely after.

It would be of great curiosity to perform the same tests on recent years for the US market. Analysis on the change in risk aversion and behaviour of investors pre, during and post crisis (specially hedge funds) could also derive important conclusions for the explanation of the anomaly.

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8. Annexes

TABLE I

MEAN VALUES FOR TEN PORTFOLIOS FORMED ANNUALLY BY ASSIGNING FIRMS TO DECILES BY THEIR MAGNITUDE OF ACCRUALS.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Panel A:										
Accruals	-0.2405	-0.1277	-0.0895	-0.0658	-0.0479	-0.0316	-0.0155	0.0044	0.0344	0.1228
Cash Flows	0.1828	0.1327	0.1078	0.0988	0.0814	0.0645	0.0562	0.0289	0.0146	-0.0998
Earnings	-0.0577	0.0050	0.0183	0.0330	0.0335	0.0329	0.0407	0.0333	0.0490	0.0230
Panel B:										
Curr Assets	-0.0159	-0.0173	-0.0065	-0.0002	0.0147	0.0146	-0.0093	0.0229	0.0408	0.1016
Curr Liab	-0.1030	-0.0374	-0.0246	-0.0141	-0.0183	-0.0066	0.0268	0.0120	0.0220	0.0429
Dep	-0.0936	-0.0705	-0.0570	-0.0518	-0.0453	-0.0395	-0.0328	-0.0309	-0.0306	-0.0281
Panel C:										
Beta	0.98	0.93	0.91	0.87	0.88	0.85	0.89	0.85	0.91	0.91
T-test	10.8461*	12.186*	12.6344*	14.6194*	13.9689*	14.0784*	15.4083*	13.387*	13.2743*	12.0272*
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Size	13.93	14.51	14.59	15.20	15.08	14.75	14.59	14.72	14.28	13.85
Panel D:										
ARBRISK	0.13	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.12
Volume	2.31	2.64	9.10	5.23	4.79	3.85	3.09	2.59	2.96	1.91

Accruals	= the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.
Cash Flows	= the difference between earnings and accruals.
Earnings	= income from continuing operations divided by average total assets.
Curr Assets	= the change in non-cash current assets divided by average total assets.
Curr Liab	= minus the change in current liabilities (exclusive of short-term debt and taxes payable) divided by average total assets.
Dep	= minus depreciation expense divided by average total assets
Beta	= the beta coefficient from a 12 month time-series regression of the monthly excess return on the portfolio over the risk free rate on the excess return on the market over the risk free rate beginning four months after the ranking year.
ARBRISK	= the residual variance from a standard market model regression of its excess returns on the excess returns of the market index used over the 36 months ending one month prior to 1st of April of the post ranking year.
Size	= the natural log of the market value of common equity (in millions of euros) measured at fiscal year end.
Volume	= the daily closing price times the daily shared (in millions) traded averaged over a year ending on month prior to April 1 of the post ranking year (250 trading days).

* Denotes significance at the 0.01 level using a two-tailed t-test.
** Denotes significance at the 0.05 level using a two-tailed t-test.
*** Denotes significance at the 0.10 level using a two-tailed t-test.
Sample Consists of 13,602 Firm-years between 2007-2014.

TABLE II

OLS REGRESSIONS OF FUTURE EARNINGS PERFORMANCE ON CURRENT EARNINGS.

Panel A:

$$Earnings_{t+1} = \alpha_0 + \alpha_1 * Earnings_t + \varepsilon_{t+1}$$

	Industry Level	Std Dev	T-test	p-value
α_0	0.0065	0.0031	2.1106**	0.0373
α_1	0.5983	0.0827	7.2349*	0.0000
R^2	0.34			
N	102			

Panel B:

$$Earnings_{t+1} = \beta_0 + \beta_1 * Accruals_t + \beta_2 * Cashflows_t + \varepsilon_{t+1}$$

	Industry Level	Std Dev	T-test	p-value
β_0	0.0253	0.0047	5.3931*	0.000
β_1	0.8661	0.0919	9.4235*	0.000
β_2	0.5197	0.0760	6.8344*	0.000
R^2	0.47			
F-test	52.3435*			
p-value	0.0000			
N	102			

Accruals = the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.
Cash Flows = the difference between earnings and accruals.
Earnings = income from continuing operations divided by average total assets.
* Denotes significance at the 0.01 level using a two-tailed t-test.
** Denotes significance at the 0.05 level using a two-tailed t-test.
*** Denotes significance at the 0.10 level using a two-tailed t-test.
Sample consists of 11,172 firm-years assigned to 17 portfolios by industry level classification (using the first two digits of the NACE Rev 2 codes) from 2008 to 2014

TABLE III

TIME-SERIES MEANS OF EQUALLY WEIGHTED PORTFOLIOS ABNORMAL STOCK RETURNS (MEASURED BY JENSEN'S ALPHA) SORTED BY MAGNITUDE OF ACCRUALS.

Portfolio Accrual Ranking	Jensen's Alpha Year + 1	Std Dev	T-test	p-value	R^2
Lowest	0.0049	0.0037	1.3270	0.1883	0.59
2	0.0072	0.0031	2.3067**	0.0236	0.64
3	0.0045	0.0030	1.5305	0.1298	0.66
4	0.0040	0.0025	1.6279	0.1074	0.72
5	0.0057	0.0026	2.1914**	0.0313	0.70
6	0.0057	0.0025	2.2788**	0.0253	0.71
7	0.0048	0.0024	2.0184**	0.0468	0.74
8	0.0042	0.0026	1.6023	0.1129	0.69
9	0.0056	0.0028	1.9864**	0.0500	0.68
Highest	0.0019	0.0031	0.6053	0.5467	0.64
Hedge	0.0031	0.0023	1.3268	0.1883	0.02

The Jensen's alpha is the estimated value of α from (Rpt-Rft)= αp+ βp(Rmt-Rft)+ ∈pt , where Rpt denotes the return to portfolio p in year t. Rft is the risk free rate, measuerd using the contemporaneous 1 year Germany Government bonds. Rmt is the market return, estimated using the monthly returns of the STOXX 600 index. The return cumulation period begins four mouths after the fiscal year-end.

The hedge portfolio consists of a long position in the lowest accrual portoflio and an offsetting short position in the highest accrual portfolio.
* Denotes significance at the 0.01 level using a two-tailed t-test.
** Denotes significance at the 0.05 level using a two-tailed t-test.
*** Denotes significance at the 0.10 level using a two-tailed t-test.
Sample consists of 11,172 Firm-years betwween 2008 and 2014.

TABLE IV

OLS REGRESSIONS OF EXPLANATORY POWER OF ACCRUALS WITH RESPECT TO FUTURE ANNUAL STOCK RETURNS.

Panel A:

$$Returns_{t+1} = \alpha_0 + \alpha_1 * Accruals_t + \varepsilon_{t+1}$$

	Industry Level	Std Dev	T-test	p-value
α_0	0.0763	0.0334	2.2850**	0.0241
α_1	-0.2952	0.5421	-0.5446	0.5871
R^2	0.00			
N	119			

Panel B:

$$Returns_{t+1} = \beta_0 + \beta_1 * CurrAssets_t + \beta_2 * CurrLiab_t + \beta_3 * Dep_t + \varepsilon_{t+1}$$

	Industry Level	Std Dev	T-test	p-value
β_0	0.0880	0.0201	4.3751*	0.0000
β_1	0.0013	0.0105	0.1280	0.8983
β_2	-0.0035	0.0090	-0.3857	0.7004
β_3	-0.0056	0.0145	-0.3847	0.7011
R^2	0.00			
F-test	0.1809			
p-value	0.9092			
N	119			

Accruals	= the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.
Curr Assets	= the change in non-cash current assets divided by average total assets.
Curr Liab	= minus the change in current liabilities (exclusive of short-term debt and taxes payable) divided by average total assets.
Dep	= minus depreciation expense divided by average total assets
Returns	= monthly returns starting on April of the post valuation year and finishing 1 year later on March.

* Denotes significance at the 0.01 level using a two-tailed t-test.

Sample consists of 11,172 firm-years assigned to 17 portfolios by Industry level classification (using the first two digits of the NACE Rev 2 codes) from 2008 to 2014

TABLE V

OLS REGRESSION OF EXPLANATORY POWER OF ACCRUALS AND PROXIES FOR BARRIERS TO ARBITRAGE WITH RESPECT TO FUTURE ANNUAL STOCK RETURNS.

$$Returns_{t+1} = \beta_0 + \beta_1{*}Accruals_t + \beta_2{*}ARBRISK_t + \beta_3{*}Size_t + \beta_4{*}Volume_t + \varepsilon_{t+1}$$

	Industry Level	Std Dev	T-test	p-value
β_0	0.5947	0.2394	2.4847**	0.0144
β_1	0.0421	0.5417	0.0777	0.9382
β_2	-0.5046	0.8683	-0.5812	0.5623
β_3	-0.0338	0.0163	-2.075**	0.0402
β_4	0.0052	0.0013	3.9668*	0.0001
R^2	0.14			
F-test	4.4670*			
p-value	0.0022			
N	119			

Accruals	= the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.
ARBRISK	= the residual variance from a standard market model regression of its excess returns on the excess returns of the market index used over the 36 months ending one month prior to 1st of April of the post ranking year.
Size	= the natural log of the market value of common equity (in millions of euros) measured at fiscal year end.
Volume	= the daily closing price times the daily shared (in millions) traded averaged over a year ending on month prior to April 1 of the post ranking year (250 trading days).
Returns	= monthly returns starting on April of the post valuation year and finishing 1 year later on March.

* Denotes significance at the 0.01 level using a two-tailed t-test.

** Denotes significance at the 0.05 level using a two-tailed t-test.

*** Denotes significance at the 0.10 level using a two-tailed t-test.

Sample consists of 11,172 firm-years assigned to 17 portfolios by Industry level classification (using the first two digits of the NACE Rev 2 codes) from 2008 to 2014

TABLE VI

OLS REGRESSIONS OF FUTURE EARNINGS PERFORMANCE ON CURRENT EARNINGS. COMPARISON OF YEAR 2008 WITH PERIOD 2009 TO 2014

Panel A:

$$Earnings_{t+1} = \alpha_0 + \alpha_1 * Earnings_t + \varepsilon_{t+1}$$

2008	Industry Level	Std Dev	T-test	p-value
α_0	0.0024	0.0081	0.2953	0.7718
α_1	0.4541	0.2012	2.2572**	0.0393
R^2	0.25	N	17	

2009-2014	Industry Level	Std Dev	T-test	p-value
α_0	0.0074	0.0033	2.2383**	0.0279
α_1	0.6397	0.0913	7.0084*	0.0000
R^2	0.37	N	85	

Panel B:

$$Earnings_{t+1} = \beta_0 + \beta_1 * Accruals_t + \beta_2 * Cashflows_t + \varepsilon_{t+1}$$

2008	Industry Level	Std Dev	T-test	p-value
β_0	0.0043	0.0129	0.3340	0.7433
β_1	0.4926	0.2870	1.7167	0.1081
β_2	0.4558	0.2081	2.1898*	0.0460
R^2	0.26	N	17	
F-test	2.4032	p-value	0.1267	

2009-2014	Industry Level	Std Dev	T-test	p-value
β_0	0.0285	0.0050	5.6943*	0.0000
β_1	0.9186	0.0963	9.5376*	0.0000
β_2	0.5310	0.0825	6.4367*	0.0000
R^2	0.53	N	85	
F-test	45.5065*	p-value	0.0000	

Accruals = the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.
Cash Flows = the difference between earnings and accruals.
Earnings = income from continuing operations divided by average total assets.
* Denotes significance at the 0.01 level using a two-tailed t-test.
** Denotes significance at the 0.05 level using a two-tailed t-test.
Sample consists of 11,172 firm-years assigned to 17 portfolios by Industry level classification (using the first two digits of the NACE Rev 2 codes)

TABLE VII

OLS REGRESSIONS OF EXPLANATORY POWER OF ACCRUALS WITH RESPECT TO FUTURE ANNUAL STOCK RETURNS FOR YEAR 2008

Panel A:

$$Returns_{t+1} = \alpha_0 + \alpha_1 * Accruals_t + \varepsilon_{t+1}$$

2008	Industry Level	Std Dev	T-test	p-value
α_0	0.2572	0.0725	3.5458*	0.0029
α_1	-1.0875	1.1806	-0.9212	0.3715
R^2	0.06			
N	17			

Panel B:

$$Returns_{t+1} = \beta_0 + \beta_1 * CurrAssets_t + \beta_2 * CurrLiab_t + \beta_3 * Dep_t + \varepsilon_{t+1}$$

2008	Industry Level	Std Dev	T-test	p-value
β_0	0.2446	0.0976	2.5057**	0.0263
β_1	-1.4359	2.3760	-0.6043	0.5560
β_2	-1.0592	1.6485	-0.6425	0.5317
β_3	-1.3444	1.8789	-0.7155	0.4869
R^2	0.06	p-value	0.8413	
F-test	0.2766	N	17	

Accruals	= the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.
Curr Assets	= the change in non-cash current assets divided by average total assets.
Curr Liab	= minus the change in current liabilities (exclusive of short-term debt and taxes payable) divided by average total assets.
Dep	= minus depreciation expense divided by average total assets
Returns	= monthly returns starting on April of the post valuation year and finishing 1 year later on March.

* Denotes significance at the 0.01 level using a two-tailed t-test.

** Denotes significance at the 0.05 level using a two-tailed t-test.

Sample consists of 2,089 firm-years assigned to 17 portfolios by Industry level classification (using the first two digits of the NACE Rev 2 codes) for year 2008

TABLE VIII

OLS REGRESSIONS OF EXPLANATORY POWER OF ACCRUALS WITH RESPECT TO FUTURE ANNUAL STOCK RETURNS. FOR PERIOD 2009-2014

Panel A:

$$Returns_{t+1} = \alpha_0 + \alpha_1 * Accruals_t + \varepsilon_{t+1}$$

2009-2014	Industry Level	Std Dev	T-test	p-value
α_0	0.0485	0.0330	1.4701	0.1447
α_1	-0.1057	0.5359	-0.1973	0.8440
R^2	0.00			
N	102			

Panel B:

$$Returns_{t+1} = \beta_0 + \beta_1 * CurrAssets_t + \beta_2 * CurrLiab_t + \beta_3 * Dep_t + \varepsilon_{t+1}$$

2009-2014	Industry Level	Std Dev	T-test	p-value
β_0	0.0482	0.0202	2.3780**	0.0193
β_1	0.0030	0.0097	0.3120	0.7557
β_2	-0.0062	0.0083	-0.7384	0.4620
β_3	-0.0099	0.0135	-0.7360	0.4635
R^2	0.01	p-value	0.6961	
F-test	0.4812	N	102	

Accruals	= the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.
Curr Assets	= the change in non-cash current assets divided by average total assets.
Curr Liab	= minus the change in current liabilities (exclusive of short-term debt and taxes payable) divided by average total assets.
Dep	= minus depreciation expense divided by average total assets
Returns	= monthly returns starting on April of the post valuation year and finishing 1 year later on March.

* Denotes significance at the 0.01 level using a two-tailed t-test.

** Denotes significance at the 0.05 level using a two-tailed t-test.

Sample consists of 9,083 firm-years assigned to 17 portfolios by Industry level classification (using the first two digits of the NACE Rev 2 codes)

TABLE IX

OLS REGRESSION OF EXPLANATORY POWER OF ACCRUALS AND PROXIES FOR BARRIERS TO ARBITRAGE WITH RESPECT TO FUTURE ANNUAL STOCK RETURNS. COMPARISON ON YEAR 2008 TO PERIOD 2009-2014

Panel A:

$$Returns_{t+1} = \beta_0 + \beta_1 *Accruals_t + \beta_2 *ARBRISK_t + \beta_3 *Size_t + \beta_4 *Volume_t + \varepsilon_{t+1}$$

2008	Industry Level	Std Dev	T-test	p-value
β_0	-1.8929	0.3826	-4.9474*	0.0003
β_1	0.7431	0.7619	0.9753	0.3487
β_2	8.1443	1.5091	5.3968*	0.0002
β_3	0.1102	0.0241	4.5762*	0.0006
β_4	-0.0032	0.0011	-2.8091**	0.0158
R^2	0.78	N	17	
F-test	10.5286*	p-value	0.0007	

Panel B:

$$Returns_{t+1} = \beta_0 + \beta_1 *Accruals_t + \beta_2 *ARBRISK_t + \beta_3 *Size_t + \beta_4 *Volume_t + \varepsilon_{t+1}$$

2009-2014	Industry Level	Std Dev	T-test	p-value
β_0	0.3762	0.3842	0.9790	0.3300
β_1	-0.0907	0.5771	-0.1571	0.8755
β_2	-0.6486	0.9363	-0.6927	0.4901
β_3	-0.0179	0.0266	-0.6754	0.5010
β_4	-0.0102	0.0397	-0.2579	0.7971
R^2	0.03	N	102	
F-test	0.6757	p-value	0.6104	

Accruals = the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.

ARBRISK = the residual variance from a standard market model regression of its excess returns on the excess returns of the market index used over the 36 months ending one month prior to 1st of April of the post ranking year.

Size = the natural log of the market value of common equity (in millions of euros) measured at fiscal year end.

Volume = the daily closing price times the daily shared (in millions) traded averaged over a year ending on month prior to April 1 of the post ranking year (250 trading days).

Returns = monthly returns starting on April of the post valuation year and finishing 1 year later on March.

* Denotes significance at the 0.01 level using a two-tailed t-test.

** Denotes significance at the 0.05 level using a two-tailed t-test.

Sample consists of 11,172 firm-years assigned to 17 portfolios by Industry level classification (using the first two digits of the NACE Rev 2 codes).