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Accruals and the performance of stock returns following external financing activities

Georgios Papanastasopoulos [a,*], Dimitrios Thomakos [b], Tao Wang [c]

[a] Department of Business Administration, University of Piraeus, 80 Karaoli & Dimitriou Street, Piraeus GR-18534, Greece
[b] Department of Economics, University of Peloponnese, Greece
[c] Department of Economics (Queens College) & Graduate Center, City University of New York, USA

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ABSTRACT

This paper investigates the relation of the external financing anomaly with the accrual anomaly, by focusing separately on working capital accruals and long-term accruals. We find that external financing and accrual hedge portfolios not only generate superior returns, but they also constitute statistical arbitrage opportunities. Portfolio-level analysis and firm-level cross-sectional regressions show that the ability of external financing measures in predicting future returns remains strong, after controlling for working capital accruals. However, this ability is substantially reduced after controlling for long-term accruals. Our results appear to be consistent with investors' failure to recognise agency-related overinvestment and/or opportunistic earnings management.

1. Introduction

An extensive body of literature documents a negative relation between corporate financing activities and future stock returns, the so-called "external financing anomaly": activities raising (distributing) capital are associated with low (high) future returns.[1] This relation holds for a wide range of external financing activities (Ritter, 2003) and even to overall external financing activities (Bradshaw, Richardson, & Sloan, 2006). Associated with these studies, there is also a large literature documenting a negative relation between the level of accounting accruals and future stock returns, the so-called "accrual anomaly": firms with high (low) accruals experience low (high) future returns.[2] The relation holds for working capital accruals (Sloan, 1996), and long-term and total accruals (Richardson, Sloan, Soliman, & Tuna, 2005).

Recent studies by Cohen and Lys (2006), Dechow, Richardson, and Sloan (2008), Hardouvelis, Papanastasopoulos, Thomakos, and Wang (2010) and Richardson and Sloan (2003) provide a systematic attempt to investigate the association between these market anomalies. Collectively, these studies show that the external financing anomaly mainly captures the effects of the anomaly on total accruals. Put another way, these market anomalies are not independent but rather the two sides of the same coin. If one accepts this line of reasoning, then several common driving forces can be considered behind the

* Corresponding author.
E-mail addresses: papanast@unipi.gr (G. Papanastasopoulos), thomakos@uop.gr (D. Thomakos), tao.wang@qc.cuny.edu (T. Wang).

[1] See, among others, Affleck-Graves and Miller (2003), Billet, Flannery, and Garfinkel (2006), Daniel and Titman (2006), Fama and French (2008), Ikenberry, Lakonishok, and Vermelean (1995), Loughran and Ritter (1995, 1997), Michaely, Thaler, and Womack (1995), Pontiff and Woodgate (2008), Ritter (1991), and Spiess and Affleck-Graves (1999).

[2] See, among others, Barth and Hutton (2004), Beneish and Vargus (2002), Chan et al. (2006), Collins and Hribar (2002), Core, Guay, and Verdi (2008), Dechow and Dichev (2002), DeFond and Park (2001), Khan (2008), Thomas and Zhang (2002), and Xie (2001).

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relation of these two anomalies, such as managerial market timing, opportunistic earnings management and agency-related overinvestment, distress risk and risk induced by changes in the mix of growth options and assets in place.

While the existing evidence suggests that the external financing anomaly and the anomaly on total accruals are related asset pricing regularities, it does not imply that we yet fully understand why this may be so. This incomplete understanding of the link between these anomalies is our essential motivation in this paper: we investigate this relation by focusing on working capital accruals and long-term accruals separately. The key innovation of our research is that we develop and test hypotheses concerning how common driving forces vary conditional on the type of accounting accrual.

The remainder of the paper is organized as follows. In Section 2 we expand on our motivation and present the literature review and our research design; in Section 3 we present our data, sample formation and variable measurement; in Section 4 we critically discuss our results. Finally, we offer some concluding remarks in Section 5.

2. Motivation, literature review and research design

In this section, we go over the existing evidence on external financing and the accrual anomaly that motivate us to investigate in detail their interrelationship. We attempt, based on the literature, to explicitly show how these anomalies could be related and where our work differs in its motivation and methodology.

2.1. Motivation and literature review

The external financing anomaly refers to the negative relation between external financing activities and stock returns. Activities raising new capital such as initial public offerings, seasoned equity offerings, debt offerings and bank borrowings are associated with low future stock returns. Activities distributing capital such as stock repurchases, dividend initiations and debt repayments are associated with high future stock returns. Bradshaw et al. (2006) use a measure of net cash flows generated by both equity and debt financing activities and find that it is also negatively related with future stock returns. Notably, this extended measure of net external financing is associated with even greater returns.

As argued by Bradshaw et al. (2006), two prominent hypotheses – managerial market timing and earnings management – can be put forward to interpret these findings. Based on the market timing hypothesis, firm executives tend to issue (repurchase) securities when they are temporarily overvalued (undervalued) to exploit market mispricing (see Loughran & Ritter, 1995). Consistent with the above, Loughran and Ritter (1997) and Ritter (2003) find that earnings performance is associated with a rising trend up to the share issue, but it deteriorates after the share issue. Based on the earning management hypothesis, managers opportunistically overstate earnings around periods in which they raise external financing by exploiting (discretionary) accruals to increase the offering proceeds. Investors fail to understand earnings management, resulting in an overvaluation of issuing firms. When earnings management reverses, investors downwardly revalue issuing firms to a level justified by fundamentals. Heron and Lie (2004), Rangan (1998) and Teoh, Welch, and Wong (1998) provide evidence consistent with this explanation.

As a competing explanation, Bradshaw et al. (2006) offer the agency-related overinvestment hypothesis. According to this hypothesis, managers could invest net cash proceeds from external financing activities in zero or negative net present value (NPV) projects to serve their own interests. When investors learn that such expenditures dissipate firm value, stock prices adjust downward. In other words, lower stock returns of issuing firms are just a reflection of value destruction due to overinvestment. This explanation is consistent with the anecdotes concerning investor and manager hubris during 'hot issue' markets.

One can think at least two risk-based explanations to interpret Bradshaw et al.'s (2006) evidence on the external financing anomaly. First, issuing firms have lower distress risk, and thus are priced to yield lower expected return (see Eckbo, Masulis, & Norli, 2000). Second, based on the model of Berk, Green, and Naik (1999) firms that invest, thereby exercising growth options (i.e. convert growth options into real assets), have lower expected returns because an underlying asset is less risky than an option on that asset. Anderson and Garcia-Feijoo (2006) provide empirical support for the negative relation between capital investment (growth rate in capital expenditures) and equity risk, while Lyandres, Sun, and Zhang (2008) find less under-performance of issuing firms after conditioning on aggregate investment factors.

The accrual anomaly, first documented by Sloan (1996), refers to the negative relation between the level of accounting accruals and future stock returns: firms with high (low) accruals experience low (high) future returns. Following Healy (1985), Sloan (1996) focuses in his analysis purely on working capital accruals. Richardson et al. (2005) show a negative relation between long-term accruals and future movements in stock prices. They also extend the definition of accruals to include long-term accruals and show that this extended measure of total accruals is also associated with even greater returns.

Existing research offers a variety of explanations to interpret the accrual anomaly. Xie (2001) and Chan, Chan, Jegadeesh, and Lakonishok (2006) argue that the anomaly is mainly attributable to investors misunderstanding earnings management. Dechow et al. (2008) provide an alternative interpretation: the accrual anomaly could be driven by hubris concerning new investment opportunities due to a combination of diminishing marginal returns to increased investment and agency-related overinvestment. Khan (2008) concludes that the anomaly is simply compensation for higher distress risk.

In this paper we expand on the recent literature (see below) that shows a link between these two anomalies and, furthermore, we attempt to provide a tentative explanation for this link. The cash flow conservation equation implies that cash flows from financing activities and cash flows from operations (after taking into account cash investment in operations) are negatively related. Accounting accruals represent the difference between earnings and operating cash flows. In other words, accruals represent growth in net operating assets on a firms' balance sheet. Accruals can rise when net cash proceeds from external financing activities are booked as net operating assets, rather than used for refinancing, retained as financial assets or expensed through the income statement. Nevertheless, accruals can also rise as issuing firms inflate earnings above cash flows. Thus, firms raising (distributing) capital are more likely to have high (low) accruals: it is therefore possible that the external financing anomaly and the accrual anomaly are related to asset pricing regularities. This relation could be explained by investors' misunderstanding of earnings management, but does not require it. Several other common driving forces can also be considered: managerial market timing, misunderstanding of overinvestment, default risk, and risk induced by changes in the mix of growth options and assets in place.

The potential relation between external financing and accruals anomaly has been first assessed by Richardson and Sloan (2003). They document that the negative drift in returns following external financing activities is strongest when net cash proceeds are used to fund growth in operating assets, suggesting that they are recorded as accruals. Richardson and Sloan (2003) argue that their findings are most consistent with a combination of opportunistic earnings management and agency-related overinvestment. Cohen and Lys (2006) show that after controlling for total accruals, the negative relation between net external financing and future stock returns is attenuated and not statistically significant. They interpret their findings as more consistent with overinvestment rather than with market timing. Dechow et al. (2008) find that net external financing trading portfolios do not yield significant returns, conditional on reinvested earnings (the sum of total accruals and retained cash flows). Hardouvelis et al. (2010) show that, conditional on measures of past performance, firms with high (low) net external financing are characterized by high (low) accruals attributable to managerial discretion and exhibit poor (strong) future stock price performance. They argue that opportunistic earnings management constitutes an important driving force of the external financing anomaly.

While the existing evidence suggests that the external financing anomaly mainly captures the effects of the anomaly on total accruals, it does not imply that the concept of this relation per se is explained away. This issue motivates us to investigate this relation by focusing on accruals from different business activities separately. Accounting accruals can be decomposed into two major categories based on the underlying business activity they capture working capital accruals and long-term accruals. Working capital accruals reflect information embodied in operating activities, while long-term accruals relate to investing activities (i.e., they refer to accruals arising from accounting for investment in net long-term operating assets). We argue that accrual components should be considered separately for at least two reasons. First, as long as they are not perfectly correlated, they could provide a more detailed classification of firms with high (low) net external financing. Second, and more importantly, they could provide a more accurate picture of the rationale of the association between the external financing anomaly and the accrual anomaly.

As documented by Dechow (1994), Dechow, Kothari, and Watts (1998) and Guay, Kothari, and Watts (1996), accounting accruals improve earnings ability to reflect firm performance in that they minimize timing and matching problems inherent to cash flows.[3] Feltham and Ohlson (1995) and Ohlson (1995) show that future profitability and firm value depend on growth as well as current profitability. Richardson et al. (2005) provide a comprehensive measure of total accruals (intuitively, the difference between GAAP earnings and cash earnings) that includes changes in all non-cash asset and liability accounts as accruals of expected future benefits or obligations. Working capital accruals (related to changes in current operating asset/liability accounts) and long-term accruals (related to changes in non-current operating asset/liability accounts) are not only components of current profitability, but they also affect accounting measures of firm growth. Working capital accruals represent growth in net current operating assets and long-term accruals represent growth in net long-term operating assets, while both increase (decrease) current profits. It is well known that diminishing marginal returns to increased investment tend to reduce future profitability of growing firms. Fairfield, Whisenant, and Yohn (2003) show that the effects of diminishing marginal returns to increased investment do not differ between current and long-term net operating asset growth: working capital accruals and long-term accruals do not differ in their implications for future firm performance. Fairfield et al. (2003) also find that investors overvalue working capital accruals in a similar manner to long-term accruals.[4] Thus, if the external financing anomaly captures the effect of the anomaly on total accruals due to managerial market timing, then there should be no predictable stock returns following external financing activities after controlling for working capital accruals and long-term accruals. This leads to our first hypothesis:

H1. The relation of the external financing anomaly with the anomaly on total accruals is driven by timing-based managerial decisions to exploit investors' mispricing of working capital accruals *and* long-term accruals.

Nevertheless, the beneficial role of accruals is reduced to the extent that managers manipulate earnings through accruals. Healy and Wahlen (1999) define earning management as follows: "Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company, or to influence contractual outcomes that depend on reported accounting numbers." Both components of accruals may stem from managerial discretion. Working capital accruals may rise,

[3] Accruals also allow for the timely recognition of gain and loss due to unanticipated revisions of expected future cash flows, albeit in an asymmetrical fashion (see Ball, Kothari, & Robin, 2000; Ball, Robin, & Wu, 2003; Basu, 1997). The asymmetry arises from the conservative nature of GAAP, where losses are recognized immediately and the recognition of gains is deferred to the future until realized.

[4] Fairfield et al. (2003) label long-term accruals as a generic form of growth.

for example, as firm executives record sales prematurely or allocate more overhead expenses to inventory than to cost of goods sold. In a similar vein, long-term accruals may rise as managers inappropriately book operating costs to property, plant and equipment (see Dechow, Ge, & Schrand, 2010). We need to stress here that there is no theory or empirical evidence suggesting that managers of firms with high net external financing deliberately manipulate earnings more or less through working capital as opposed to long-term accruals or vice-versa. At the same time, using the level of working capital accruals and long-term accruals, one cannot perfectly infer what portion of their level is discretionary (i.e., managed). In other words, the level of either working capital accruals or long-term accruals does not serve on its own as a measure of earnings manipulation. Thus, if the external financing anomaly captures the effect of the anomaly on total accruals due to a misunderstanding of earnings management, then there should be no predictable stock returns following external financing activities, after controlling for working capital accruals and/or long-term accruals. This leads to our second hypothesis:

H2. The relation of external financing anomaly and the anomaly on total accruals is driven by investors' misunderstanding of earnings management through working capital *and/or* long-term accruals.[5]

The importance of some common driving forces between the external financing anomaly and the anomaly on total accruals varies across different accrual components. Long-term accruals measure changes in invested capital and such changes may be associated with agency-related overinvestment (see Dechow et al., 2008). In other words, long-term accruals could be recorded in higher magnitude than working capital accruals as managers use net proceeds from external financing to overinvest in order to consume the perquisites that come with a larger firm. Thus, if the external financing anomaly captures the effect of the anomaly on total accruals as a consequence of market undereaction to the information contained in possible overinvestment, then stock returns following external financing activities should disappear or reduced substantially, conditional on long-term accruals. This leads to our third hypothesis:

H3. The relation of external financing anomaly and the anomaly on total accruals is driven from investors' misunderstanding of managers overinvestment that is more likely to be recorded on long-term accruals.

Similarly, capital expenditures directly impact the mix of assets in place relative to growth options and can thereby alter risk. Long-term accruals could be more correlated with this type of risk than working capital accruals. Thus, if the external financing anomaly captures the effect of the anomaly on total accruals as compensation for risk associated with capital investment, then long-term accruals should pick up returns associated with external financing activities. This leads to our fourth hypothesis:

H4. The relation of external financing anomaly and the anomaly on total accruals is driven by the risk that is induced by changes in the mix of growth options and assets in place that is more likely to be associated with long-term accruals.

Khan (2008) shows that working capital accruals are correlated with financial distress characteristics (low sales, low earnings, high interest expense, low Altman Z-score). Thus, if the external financing anomaly captures the effect of the anomaly on total accruals as compensation for distress risk, then working capital accruals should pick up returns associated with external financing activities. This leads to our final hypothesis:

H5. The relation of external financing anomaly and the anomaly on total accruals is driven by distress risk that is associated with working capital accruals.

2.2. Research design

Following Bradshaw et al. (2006), we use the net amount of cash generated by corporate financing activities (ΔXFIN) as a composite measure that allows us to focus on both entire and individual corporate financing transactions. This measure is equal to the sum of net cash flow from equity financing activities (ΔEQUITY, hereafter) and debt financing activities (ΔDEBT, hereafter):

$$\Delta XFIN_t = \Delta EQUITY_t + \Delta DEBT_t \tag{1}$$

ΔEQUITY is defined as the difference between cash flows received from issuance of new equity and cash flows used for stock repurchases and dividend payments.[6] ΔDEBT is defined as the difference between cash flows received from issuance of new debt and cash flows used for debt repayments. However, we also distinguish between net short-term and long-term debt financing activities since their predictive power for future stock returns could differ. Previous work has not generally distinguished between different forms of debt financing activities and their effects on stock prices. In particular, ΔDEBT will be also decomposed into net cash flows generated from short-term debt financing activities (ΔSDEBT, hereafter) and long-term debt financing activities (ΔLDEBT, hereafter)

$$\Delta DEBT_t = \Delta LDEBT_t + \Delta SDEBT_t \tag{2}$$

[5] Note that while in H1 we claim that timing-based managerial decisions to exploit mispricing is associated with both working capital accruals and long-terms accruals, in H2 we are a priori agnostic as to whether the misunderstanding of earnings management is associated with a union or an intersection between working capital and long-term accruals (i.e. whether this misunderstanding comes from one or the other variable (union) or it comes from both variables (intersection)).

[6] Given the more discretionary nature of dividend payments, we follow Bradshaw et al. (2006) and treat them as retirements of equity.

ΔSDEBT (ΔLDEBT) is defined as the difference between cash flows received from short (long) term debt issues and cash flows distributed for short (long) term debt repayments. To our knowledge, this is the first paper in the literature that focuses on the relation between short-term and long-term debt financing activities with future stock returns.

As in Cohen and Lys (2006) we use accrual measures employed in Richardson et al. (2005) and Dechow et al. (2008). These studies argue that Healy's (1985) definition of accruals as growth in non-cash working capital less depreciation expense is narrow since it ignores accruals relating to net long-term operating assets (e.g. capitalized software development costs, capitalized expenditures, long-term receivables, post-retirement benefit obligations). Accordingly, they propose an extended definition of accruals that incorporates both working capital accruals and long-term accruals. Working capital accruals $CACC_t$ are defined as growth in non-cash working capital and long-term accruals $NCACC_t$ as growth in net long-term operating assets. The key difference between working capital accruals and long-term accruals is that future benefits and obligations associated with the former category take shorter to be realized.[7] Therefore, total accruals $TACC_t$ are equal to the sum of working capital accruals and long-term accruals (i.e., growth in net operating assets):

$$TACC_t = CACC_t + NCACC_t \tag{3}$$

We first empirically investigate future raw returns of hedge portfolios based on the magnitude of external financing and accrual measures. An external financing hedge portfolio consists of a long position on firms reporting low levels of net external financing and a short position on firms reporting high levels of net external financing. Respectively, an accrual hedge portfolio consists of a long position on firms reporting low levels of accruals and a short position on firms reporting high levels of accruals. Recognizing that one cannot ignore risk in examining stock returns, we follow other related studies (Bradshaw et al. (2006), Cohen and Lys (2006), Dechow et al. (2008) and Hardouvelis et al. (2010)) and consider in our analysis size-adjusted returns.[8] We also apply the statistical arbitrage test of Hogan, Jarrow, Teo, and Warachka (2004) to hedge portfolios on all external financing and accrual measures. This test circumvents the "bad model" problem of stock return tests in the anomalies literature since its definition is not contingent upon a specific model of market returns. In particular, we test two implications of statistical arbitrage for each portfolio: whether its mean annual incremental profit is positive and whether its time-averaged variance decreases over time. To our knowledge, this is the first paper that examines whether hedge portfolios on external financing measures constitute statistical arbitrage opportunities. Examining the overall performance of hedge portfolios allows us to gauge the economic significance of stock returns that are predictable by external financing and accrual measures.

Next, we investigate future raw and size-adjusted returns of hedge portfolios on external financing portfolios, *conditional on accrual measures* (two-dimensional portfolios). Now, we can assess whether external financing measures provide economically significant future returns, after holding the level of accrual measures constant. Finally, following Fama and MacBeth (1973), we also estimate cross-sectional return regressions on external financing measures, after controlling for accrual measures (size and book to market ratio are included as additional control variables).

3. Data, sample formation and variable measurement

Our sample covers all firm-year observations with available data on Compustat and CRSP files for the period 1962–2003. Since there is an ambiguity as to what constitutes operating and financing activities for financial firms, all stocks in the financial sector (with SIC codes in the range 6000–6999) are dropped from the sample. Furthermore, we require as in Beneish and Vargus (2002) all firms to have a December fiscal year end in order for the subsequent portfolio assignments to yield tradable investment portfolios. Finally, to mitigate backfilling biases, as in Fama and French (1993), a firm must be listed on Compustat for two years before it is included in the data set.[9] These criteria yield final sample sizes of 105,896 firm-year observations with non-missing financial statement and stock return data. Following Dechow et al. (2008), we use balance sheet data to compute external financing and accrual measures as follows[10]:

[7] For instance, a short-term receivable will be collected faster than a long-term receivable.

[8] In unreported tests, we also consider alphas from normative (equilibrium) models such as the capital asset pricing model and positive (empirical models) such as the Fama and French (1993) three factor model and the Carhart (1997) model and find qualitative similar results with size-adjusted returns. Nevertheless, as suggested by Loughran and Ritter (2000) positive (empirical) models are not testing market efficiency; instead they are testing whether any return patterns that exist are being captured by other return patterns. In similar vein, Bradshaw et al. (2006) caution readers against blindly interpreting factors from positive (empirical models) as rationally priced factors.

[9] If data items 9 and 34 are missing, we set them equal to zero rather than eliminating the observation. The results are qualitatively similar if we instead eliminate these observations.

[10] As documented by Dechow et al. (2008) the computation of external financing measures with balance sheet data requires clean surplus assumptions. Therefore, we cannot exclude the possibility that our external financing measures could suffer from "dirty surplus items". As in Dechow et al. (2008), our equity financing measure, does not take into account external financing transactions with preferred stock since in the US the latter item is reported between liabilities and equity. Further, as in Dechow et al. (2008), the computation of the debt financing measure requires the assumption that all interest expense is paid in cash as opposed to capitalized and added to the balance of debt. To overcome these limitations and check for robustness, we replicate all empirical tests by using external financing measures from the cash flow statement and find qualitatively similar results. However, the use of cash flow statement limits the sample size since data are available from 1988.

$$\Delta EQUITY_t = \Delta(TA_t - TL_t) - NI_t$$

where:

- NI_t: Net income (data item 18).
- TA_t: Total assets (data item 6).
- TL_t: Total liabilities (data item 181).

$$\Delta SDEBT_t = \Delta(STD_t)$$

where:

- STD_t: Short-term debt (data item 34).

$$\Delta LDEBT_t = \Delta(LTD_t)$$

where:

- LTD_t: Long-term debt (data item 9).

$$\Delta DEBT_t = \Delta SDEBT_t + \Delta LDEBT_t$$

$$\Delta XFIN_t = \Delta EQUITY_t + \Delta DEBT_t$$

$$CACC_t = \Delta(CA_t - C_t) - \Delta(CL_t - STD_t)$$

where:

- CA_t: Current assets (data item 4).
- C_t: Cash and cash equivalents (data item 1).
- CL_t: Current liabilities (data item 5).

$$NCACC_t = \Delta(TA_t - CA_t) - \Delta(TL_t - CL_t - LTD_t)$$

$$TACC_t = CACC_t + NCACC_t$$

Consistent with previous research, all external financing and accrual measures are deflated by contemporaneous average total assets. Similar to Bradshaw et al. (2006) and Cohen and Lys (2006), we also delete firm-year observations with an absolute value of external financing measures greater than 1 in order to eliminate the influence of outliers. As mentioned in the previous section, in our analysis, we also consider market capitalization (MV) and the book to market ratio (BV/MV). Market capitalization is measured as price per share (item 199) times shares outstanding (item 25) at the beginning of the return cumulation period. Book to market ratio is defined as the ratio of the fiscal year end book value of total equity (item 6 − item 181) to the market capitalization.

The annual one-year ahead raw stock return RET_{t+1} for a firm is measured using compounded 12-monthly buy-hold returns inclusive of dividends and other distributions from the CRSP files. Then, the size-adjusted return $SRET_{t+1}$ for a firm is computed as the difference between RET_{t+1} and the annual buy-hold return of all other firms in the same market capitalization-based portfolio decile to which the firm belongs. Note that the return cumulation period starts four months after the fiscal year end to ensure that investors have financial statement data prior to forming portfolios. For delisted firms during our future return window, we calculate the remaining return by first considering CRSP delisting return and then reinvesting any remaining proceeds in the CRSP value-weighted market index. For firms delisted due to poor performance (delisting codes 500 and 520–584) with missing delisting returns, we apply a delisting return of −100%.

4. Empirical results

4.1. Descriptive statistics

Table 1 reports univariate statistics and pair-wise correlations for external financing and accrual measures. Panel A provides univariate statistics (mean, standard deviation, 25th percentile, median, 75th percentile). The mean values of ΔXFIN, ΔEQUITY, ΔDEBT, ΔSDEBT and ΔLDEBT are 0.059, 0.034, 0.025, 0.004 and 0.021, respectively. These positive mean values indicate that firms raise more capital than they distribute over our sample period. The median values of all external financing variables are close to zero, suggesting that the right tail of the distribution drives their positive mean values. The mean values of TACC, CACC and NCACC are 0.058, 0.014 and 0.044, respectively. The median values of TACC, CACC and NCACC are 0.044, 0.009 and 0.024, respectively. These positive mean and median values indicate that firms grew their asset bases during our

Table 1
Univariate statistics and pair-wise correlations. The below table reports univariate statistics (mean, standard deviation, 25th percentile, median, 75th percentile) and pair-wise correlations (Pearson and Spearman) for external financing and accrual measures. Panel A presents univariate statistics, while Panel B pair-wise correlations.

Panel A: Univariate statistics

	Mean	St. dev	25th percentile	Median	75th percentile
ΔXFIN	**0.059**	0.284	−0.044	0.001	0.08
ΔEQUITY	**0.034**	0.255	−0.029	−0.007	0.015
ΔDEBT	**0.025**	0.145	−0.02	0	0.056
ΔSDEBT	**0.004**	0.086	−0.008	0	0.016
ΔLDEBT	**0.021**	0.129	−0.015	0	0.039
TACC	**0.058**	0.247	−0.021	0.044	0.122
CACC	**0.014**	0.104	−0.021	0.009	0.048
NCACC	**0.044**	0.218	−0.012	0.024	0.079

Panel B: Pair-wise correlations – Pearson (above diagonal) and Spearman (below diagonal)

	ΔXFIN	ΔEQUITY	ΔDEBT	ΔSDEBT	ΔLDEBT	TACC	CACC	NCACC
ΔXFIN	______	**0.86**	**0.447**	**0.194**	**0.374**	**0.533**	**0.236**	**0.492**
ΔEQUITY	**0.594**	______	**−0.072**	**−0.056**	**−0.044**	**0.325**	**0.104**	**0.319**
ΔDEBT	**0.692**	**−0.029**	______	**0.476**	**0.808**	**0.473**	**0.281**	**0.402**
ΔSDEBT	**0.349**	**−0.023**	**0.505**	______	**−0.133**	**0.211**	**0.239**	**0.125**
ΔLDEBT	**0.535**	**−0.011**	**0.757**	0.001	______	**0.392**	**0.156**	**0.37**
TACC	**0.62**	**0.202**	**0.613**	**0.318**	**0.491**	______	**0.473**	**0.908**
CACC	**0.328**	**0.081**	**0.336**	**0.268**	**0.194**	**0.624**	______	**0.062**
NCACC	**0.536**	**0.171**	**0.542**	**0.218**	**0.501**	**0.802**	**0.157**	______

Notes: Means and correlations significant at the 5% level are bolded. The sample consists of 105,896 firm-year observations with coverage on Compustat and CRSP files for the period 1962-2003 (details about the formation of the sample are provided in Section 3).
Variable measurement: ΔXFIN is net external financing, calculated as the sum of net equity financing (ΔEQUITY) and net debt financing (ΔDEBT). ΔEQUITY is measured as the difference between the change in total equity (data item 6 − data item 181) and net income (data item 18). ΔDEBT is calculated as the sum of net short-term debt financing (ΔSDEBT) and net long-term debt financing (ΔLDEBT). ΔSDEBT is measured as the change in short-term debt (data item 34). ΔLDEBT is measured as the change in long-term debt (data item 9). TACC is total accruals, calculated as the sum of working capital accruals (CACC) and long-term accruals (NCACC). CACC is measured as the difference between the change in current operating assets (data item 4 − data item 1) and the change in current operating liabilities (data item 5 − data item 34). NCACC is measured as the difference between the change in non-current operating assets (data item 6 − data item 4) and the change in non-current operating liabilities (data item 181 − data item 5 − data 9). All variables are deflated by average total assets (data item 6).

sample periods. The standard deviations of ΔXFIN, ΔEQUITY and ΔDEBT are 0.284, 0.255 and 0.145, respectively, suggesting that variation is greater in net equity financing relative to net debt financing. The standard deviations of ΔSDEBT and ΔLDEBT are 0.086 and 0.129, respectively, indicating that variation is greatest in net long-term debt financing. Turning to accrual measures, we see that the standard deviations of TACC, CACC and NCACC are 0.247, 0.104 and 0.218, respectively, indicating that variation is greater in long-term accruals than working capital accruals. Overall, the univariate statistics to external financing and accrual measures are similar with those reported in prior related research.

Panel B presents pair-wise correlations – Pearson (above diagonal) and Spearman (below diagonal) between external financing and accrual measures. Several of the correlations are noteworthy. In particular, there is a strong positive correlation between ΔXFIN and TACC (Pearson: 0.533, Spearman: 0.62). ΔXFIN is more correlated with NCACC (Pearson: 0.492, Spearman: 0.536) than with CACC (Pearson: 0.236, Spearman: 0.328). Further, all external financing measures, except net short-term debt financing, are more correlated with NCACC than with CACC. As in prior related studies, there is a negative correlation between ΔEQUITY and ΔDEBT (Pearson: −0.072, Spearman: −0.029), a finding indicating possible refinancing transactions (e.g. issuing debt to repurchase equity and vice-versa). ΔSDEBT and ΔLDEBT are also found negatively correlated with ΔEQUITY.

4.2. Returns and arbitrage opportunities of portfolios on external financing and accrual measures

In this section, we investigate the performance of portfolios based on the magnitude of external financing and accrual measures. For this purpose, we rank firms annually on each measure and allocate them into ten equal-sized portfolios (deciles) based on these ranks. We then report time-series averages of equal-weighted future raw and size-adjusted stock returns (*t*-statistics in italics) for each portfolio. We also report time-series averages of returns (*t*-statistics in italics) for hedge portfolios consisting of a long (short) position in the lowest (highest) decile.

In Panel A of Table 2, we report raw returns for portfolios based on the magnitude of external financing measures. Starting with ΔXFIN, we see that raw returns on net repurchasers and net issuers are 0.201 and 0.098, respectively. The hedge portfolio on ΔXFIN generates a raw return of about 0.103. Turning to ΔEQUITY, the raw return for equity issuers and dividend paying firms is 0.19 and for equity issuers it is 0.111, while for the hedge portfolio it is 0.079. Firms that repay debt have a raw return of about 0.204, firms that issue debt 0.112, while the hedge raw return on ΔDEBT is 0.092, respectively. From a closer look at debt financing proxies, we see that ΔSDEBT and ΔLDEBT hedge portfolios generate raw returns of about 0.049 and 0.085, respectively.

Table 2
Raw and size-adjusted returns of portfolios on external financing measures. The below table presents one-year ahead raw returns and size-adjusted annual stock returns for portfolios based on the magnitude of external financing measures. Each year firms are sorted independently on external financing measures and allocated into ten equal-sized portfolios (deciles) based on these ranks. We then report time-series averages (*t*-statistics in italics) of one-year ahead raw and size-adjusted returns for these portfolios. Time-series averages of one-year ahead raw and size-adjusted returns (*t*-statistics in italics) for hedge portfolios consisting of a long (short) position in the lowest (highest) decile, are also reported. Panel A presents raw returns, while Panel B size-adjusted returns.

	1 (Low)	2	3	4	5	6	7	8	9	10 (High)	Hedge (1−10)
Panel A: Raw returns of decile portfolios on external financing measures											
ΔXFIN	0.201	0.203	0.184	0.194	0.196	0.177	0.161	0.153	0.124	0.098	0.103
	5.379	***6.008***	***5.691***	***5.518***	***4.998***	***4.561***	***4.453***	***3.989***	***3.021***	***2.092***	***4.203***
ΔEQUITY	0.19	0.16	0.159	0.167	0.192	0.202	0.181	0.184	0.147	0.111	0.079
	5.965	***5.485***	***5.666***	***4.757***	***4.879***	***5.008***	***4.607***	***3.905***	***3.229***	***2.178***	***2.537***
ΔDEBT	0.204	0.213	0.181	0.179	0.193	0.157	0.166	0.147	0.14	0.112	0.092
	4.52	***5.267***	***5.088***	***4.698***	***4.512***	***4.714***	***4.586***	***4.386***	***3.926***	***2.646***	***5.461***
ΔSDEBT	0.196	0.176	0.176	0.166	0.182	0.185	0.16	0.154	0.15	0.147	0.049
	4.515	***4.99***	***4.783***	***4.677***	***4.276***	***4.513***	***4.496***	***4.465***	***4.195***	***3.531***	***2.965***
ΔLDEBT	0.2	0.196	0.184	0.184	0.184	0.171	0.162	0.151	0.146	0.115	0.085
	4.541	***5.215***	***5.022***	***4.713***	***4.343***	***4.597***	***4.432***	***4.791***	***4.007***	***2.832***	***5.232***
Panel B: Size-adjusted returns of decile portfolios on external financing measures											
ΔXFIN	0.047	0.054	0.037	0.047	0.049	0.032	0.013	0.008	−0.023	−0.051	0.098
	4.478	***7.395***	***4.35***	***4.89***	***4.315***	***2.782***	*1.16*	*0.795*	***−2.172***	***−2.624***	***4.148***
ΔEQUITY	0.045	0.02	0.016	0.025	0.04	0.052	0.032	0.025	−0.004	−0.037	0.082
	5.256	***2.254***	*1.322*	***2.238***	***4.241***	***4.488***	***3.21***	*1.586*	*−0.209*	***−2.031***	***2.958***
ΔDEBT	0.041	0.057	0.039	0.033	0.05	0.011	0.021	0.004	−0.004	−0.039	0.08
	3.18	***6.392***	***5.032***	***2.316***	***2.247***	*1.256*	*1.822*	*0.477*	*−0.413*	***−2.901***	***4.689***
ΔSDEBT	0.039	0.029	0.035	0.017	0.031	0.041	0.019	0.011	0.002	−0.01	0.049
	3.018	***3.651***	***3.293***	*1.892*	*1.36*	***3.246***	***2.319***	*1.135*	*0.224*	*−0.996*	***3.118***
ΔLDEBT	0.036	0.041	0.039	0.036	0.037	0.026	0.016	0.011	0.004	−0.033	0.069
	3.257	***4.504***	***4.903***	***3.086***	*1.817*	*1.883*	*1.647*	*1.554*	*0.433*	***−2.535***	***4.432***

Notes: Bold *t*-statistics indicate significance at less than 5% level (2-tailed). External financing measures are defined in the note to Table 1. Raw annual return (RET) for a firm is measured using compounded 12-monthly buy-hold returns inclusive of dividends and other distributions. Size-adjusted annual return (SRET) for a firm is computed as the difference between the raw annual return and the buy-hold annual return of all other firms in the same market capitalization (measured as price per share (item 199) times shares outstanding (item 25)) – based portfolio decile to which the firm belongs.

Panel B of Table 2 presents size-adjusted returns for portfolios based on the magnitude of external financing measures. From the first column, we see that the size-adjusted return on net repurchasers is 0.047 and on net issuers is −0.051, while for the hedge portfolio on ΔXFIN is 0.098. Turning to ΔEQUITY, we see that size-adjusted returns for net repurchasers and net issuers are 0.045 and −0.037, respectively, while for the hedge portfolio it is 0.082. Further, firms that repay debt have a size-adjusted return of about 0.041 and firms that issue debt −0.039, while the hedge size-adjusted return on ΔDEBT is 0.08. Turning to debt financing proxies, we see that hedge portfolios on ΔSDEBT and ΔLDEBT generate size-adjusted returns of about 0.049 and 0.069, respectively. Taking into account hedge raw returns for ΔSDEBT and ΔLDEBT, our findings indicate that both forms of debt financing activities are negatively related with future stock returns, although the relation is stronger for long-term debt financing activities. Note also that both hedge raw and size-adjusted returns on all external financing portfolios are found to be positive in the great majority of years of our sample period. Overall, our results generally confirm evidence documented in prior studies that focus on entire, equity and debt external financing activities. Bradshaw et al. (2006) report hedge size-adjusted returns of 0.155, 0.112 and 0.081 for net external financing, net equity financing and net debt financing, respectively (US firms). Hardouvelis et al. (2010) show that size-adjusted returns on net external financing, net equity financing and net debt financing hedge portfolios are 0.116, 0.092 and 0.066, respectively (US firms). At the same time, no previous research of which we are aware has focused separately on short-term debt and long-term debt external financing activities.

Nevertheless, a common critique on market anomalies relies on their existence after removing small firms (with low market capitalization). Chan and Lakonishok (1997) among others argue that small stocks are less liquid and have greater transaction costs than large stocks. Fama and French (2008) document that, while small firms represent on average only a small portion of the market wealth, they account more than half of the firms in extreme portfolios that exploit market anomalies. Thus, if extreme returns of hedge portfolios on external financing measures are attributable to small firms, then they could be of secondary interest. To investigate the pervasiveness of returns associated with external financing activities, in unreported tests (available on request) we examine the performance of hedge portfolios on external financing measures after removing stocks with market capitalization below the 40th NYSE market equity percentile. Our results indicate, that the performance of hedge portfolios on all external financing measures is robust for large firms, although the magnitude of raw and size-adjusted returns is somewhat lower.

Panel A of Table 3 presents raw returns for portfolios based on the magnitude of accrual measures. Firms on the lowest TACC portfolio experience raw returns of 0.254. Firms on the highest TACC portfolio experience raw returns of 0.092. The raw return of the TACC hedge portfolio is equal to 0.162. The raw return for the portfolio ranked lowest by CACC is 0.234 compared

Table 3
Raw and size-adjusted returns of portfolios on accrual measures. The below table presents one-year ahead raw returns and size-adjusted annual stock returns for portfolios based on the magnitude of accrual measures. Each year firms are sorted independently on accrual measures and allocated into ten equal-sized portfolios (deciles) based on these ranks. We then report time-series averages (*t*-statistics in italics) of one-year ahead raw and size-adjusted returns for these portfolios. Time-series averages of one-year ahead raw and size-adjusted returns (*t*-statistics in italics) for hedge portfolios consisting of a long (short) position in the lowest (highest) decile, are also reported. Panel A presents raw returns, while Panel B size-adjusted returns.

	1 (Low)	2	3	4	5	6	7	8	9	10 (High)	Hedge (1−10)
Panel A: Raw returns of decile portfolios on accrual measures											
TACC	0.254	0.229	0.193	0.192	0.166	0.157	0.144	0.138	0.127	0.092	0.162
	4.776	***5.205***	***5.279***	***5.433***	***5.232***	***4.903***	***4.149***	***4.09***	***3.396***	***2.23***	***6.296***
CACC	0.234	0.195	0.188	0.168	0.159	0.159	0.155	0.166	0.141	0.127	0.107
	4.479	***5.031***	***5.262***	***5.5***	***5.363***	***5.079***	***4.301***	***4.514***	***3.607***	***2.656***	***6.108***
NCACC	0.25	0.218	0.211	0.187	0.165	0.153	0.145	0.141	0.129	0.092	0.158
	4.763	***4.853***	***5.457***	***4.854***	***4.786***	***4.455***	***4.42***	***4.425***	***3.789***	***2.414***	***6.177***
Panel B: Size-adjusted returns of decile portfolios on accrual measures											
TACC	0.086	0.069	0.043	0.046	0.025	0.013	0.002	−0.001	−0.017	−0.053	0.139
	4.437	***4.804***	***4.353***	***4.482***	***3.307***	*1.97*	*0.271*	*−0.135*	*−1.752*	***−3.448***	***6.148***
CACC	0.069	0.044	0.043	0.026	0.018	0.017	0.013	0.021	−0.007	−0.029	0.098
	3.825	***3.2***	***4.622***	***3.041***	*1.836*	***2.131***	*1.622*	***2.326***	*−0.763*	***−2.123***	***6.101***
NCACC	0.08	0.055	0.059	0.04	0.017	0.01	0.005	0.006	−0.011	−0.05	0.13
	4.444	***3.767***	***5.552***	***4.321***	*1.973*	*1.161*	*0.641*	*0.726*	*−1.18*	***−3.305***	***6.241***

Notes: Bold *t*-statistics indicate significance at less than 5% level (2-tailed). Accrual measures are defined in the note to Table 1, while raw returns and size-adjusted returns in the note to Table 2.

to 0.127 for the highest-ranked portfolio, for a spread (i.e. hedge return) of 0.107. Firms on the bottom NCACC decile yield raw returns of 0.25, while on the top NCACC decile yield raw returns of 0.092, leading to a difference (i.e. hedge return) of 0.158. In Panel B of Table 3 we report results for size-adjusted returns for portfolios based on the magnitude of accrual measures. From the first column, we see that the size-adjusted return for low-accruals firms is 0.086 and for high-accruals firms it is −0.053, while for the hedge portfolio on TACC is 0.139. The size-adjusted return for the bottom CACC portfolio is 0.069, for the top CACC portfolio is −0.029 and for the hedge CACC portfolio is 0.098. The size-adjusted return for the portfolio ranked lowest by NCACC is 0.08 compared to −0.05 for the highest-ranked portfolio, for a difference of 0.13. Hedge raw and size-adjusted returns on all accrual portfolios are found positive in the great majority of years of our sample period. Note also that in unreported tests (available on request), we find that the performance of hedge portfolios on accrual measures is robust for large firms (without the bottom 40th NYSE percentile), although returns are of a lower magnitude. Overall, our evidence is consistent with prior research on total accruals and accrual components. Richardson et al. (2005) report hedge size-adjusted returns of 0.128, 0.165 and 0.18 for working capital accruals, long-term accruals and total accruals, respectively (US firms). Chan et al. (2006) find raw returns of 0.135 and size-adjusted returns of 0.108 for hedge portfolios on working capital accruals (UK stocks).

Our findings from Tables 2 and 3 indicate positive raw and size-adjusted returns for hedge portfolios on external financing and accrual measures. As argued by Fama, 1998 a shortcoming of these tests is that all models of expected returns are incomplete descriptions of the systematic patterns in average returns during any sample period. As a result, stock return tests are always contaminated by a “bad model” problem. In order to check the robustness of stock return results, we apply the statistical arbitrage test designed by Hogan et al. (2004) to hedge portfolios on all external financing and accrual measures. This test circumvents the “bad model” problem of stock return tests since it is not contingent upon a specific model for market returns.

According to Hogan et al. (2004), a portfolio that constitutes statistical arbitrage opportunities must be self-financing with positive expected discounted profits, a probability of a loss converging to zero and a time-averaged variance converging to zero if the probability of a loss does not become zero in finite time. The self-financing condition is enforced by investing (borrowing) profits (losses) of each portfolio. Annual raw returns are first considered from hedge portfolios on each external financing and accrual measure. Trading profits of each portfolio accumulate at the risk free rate to yield cumulative trading profits that are subsequently discounted each period. Then, the increments of discounted cumulative trading profits are considered with mean μ, growth rate of mean θ, standard deviation σ and growth rate of standard deviation λ The log likelihood function for the increments (assuming a specific stochastic process for the increments) allows the maximum likelihood estimation method to generate the parameters μ, θ, σ, λ. Under the constrained mean test ($\theta = 0$) and Theorem I of Hogan et al. (2004) a trading portfolio constitutes statistical arbitrage opportunities with $1 - \alpha$ percent confidence if the following conditions are satisfied if: H1: $\mu > 0$ and H2: $\lambda < 0$. The two parameters are tested individually with the Bonferroni inequality accounting for the combined nature of the hypothesis test. Standard error for each of the above parameters may be extracted from the Hessian matrix to produce the required corresponding *p*-value. The first hypothesis tests whether the mean annual incremental profit of the hedge portfolio is positive (2nd condition for statistical arbitrage) and the second, whether its time-averaged variance decreases over time (4th condition of statistical arbitrage).

As shown in Panel A of Table 4, hedge portfolios on external financing and accrual measures constitute statistical arbitrage opportunities at the 1% level. Similar results are reported in Panel B of Table 4 for large firms (without the bottom 40th NYSE

Table 4
Statistical arbitrage opportunities of external financing and accrual hedge portfolios. The below table presents parameter estimates and corresponding *p*-values for Hogan et al. (2004) statistical arbitrage tests on one-year ahead raw annual stock returns of hedge portfolios based on the magnitude of external financing and accrual measures. Each year firms are sorted independently on external financing and accrual measures and allocated into ten equal-sized portfolios (deciles) based on these ranks. A hedge portfolio consists of a long (short) position in the lowest (highest) decile. The risk-free asset is used to finance the hedge portfolio. H1 and H2 denote the *p*-values from statistical arbitrage tests which test whether the hedge portfolio's mean annual discounted incremental profit is positive and whether its time-averaged variance is declining over time. The sum of the H1 and H2 columns is the *p*-value for the statistical arbitrage test. Results in Panel A are given for all firms, while in Panel B for firms whose market capitalization exceeds the 40th NYSE market equity percentile.

	μ (mean)	λ (growth rate of st. dev.)	H1 ($\mu > 0$) *p*-value	H2 ($\lambda < 0$) *p*-value	Sum (H1 + H2) *p*-value	Statistical arbitrage
Panel A: Statistical arbitrage opportunities of external financing and accrual hedge portfolios						
ΔXFIN	0.027	−0.576	0.000	0.000	0.000	Yes
ΔEQUITY	0.023	−0.482	0.000	0.000	0.000	Yes
ΔDEBT	0.022	−0.701	0.000	0.000	0.000	Yes
ΔSDEBT	0.011	−0.696	0.002	0.000	0.002	Yes
ΔLDEBT	0.021	−0.678	0.000	0.000	0.000	Yes
TACC	0.039	−0.507	0.000	0.000	0.000	Yes
CACC	0.024	−0.739	0.000	0.000	0.000	Yes
NCACC	0.036	−0.628	0.000	0.000	0.000	Yes
Panel B: Statistical arbitrage opportunities of external financing and accrual hedge portfolios (large firms)						
ΔXFIN	0.019	−0.654	0.001	0.000	0.001	Yes
ΔEQUITY	0.019	−0.475	0.000	0.000	0.000	Yes
ΔDEBT	0.014	−0.793	0.000	0.000	0.000	Yes
ΔSDEBT	0.007	−0.822	0.009	0.000	0.009	Yes
ΔLDEBT	0.014	−0.558	0.000	0.002	0.002	Yes
TACC	0.023	−0.665	0.000	0.000	0.000	Yes
CACC	0.019	−0.898	0.000	0.000	0.000	Yes
NCACC	0.019	−0.539	0.000	0.000	0.000	Yes

Notes: All tests on statistical arbitrage are significant at less than the 1% level (reject the hypothesis of no arbitrage). External financing and accrual measures are defined in the note to Table 1, while raw returns and market capitalization in the note to Table 2.

percentile) Note, that if one agrees that the notion of statistical arbitrage is incompatible with market equilibrium, and by inference, market efficiency (Jarrow, 1988, chapter 19), then our evidence do not appear to support a risk-based interpretation for the relation between the external financing anomaly and the accrual anomaly.[11]

Our firm-level portfolio findings up to this point, indicate that external financing and accrual measures can help in predicting future stock returns and are associated with statistical arbitrage opportunities. These findings do not support the last two hypotheses that the relation between external financing and accrual anomalies is driven by risk due to real investment policies (H4) or by distress risk (H5).

4.3. Returns for two-dimensional portfolios on net external financing and accrual measures

In this section, we investigate in detail the hypotheses concerning the relation of external financing and accrual anomalies, by considering two-dimensional portfolios. In particular, we follow Dechow et al. (2008) and investigate the performance of decile portfolios on external financing measures, after controlling for accrual measures.[12] To consider portfolios on ΔXFIN after controlling for TACC, we first rank firms annually into ten equal-sized portfolios based TACC and subsequently sort them into ten equal-sized subportfolios based on ΔXFIN. We next combine together all subportfolios on ΔXFIN of decile rank 1, all subportfolios on ΔXFIN of decile rank 2, etc., up to all subportfolios on ΔXFIN of decile rank 10. This procedure allows substantial variation in ΔXFIN, while holding TACC relatively constant. We then report time-series averages of equal-weighted future size-adjusted returns (*t*-statistics in italics) for each of these ΔXFIN subdeciles. Time-series averages of returns (*t*-statistics in italics) for hedge portfolios consisting of a long (short) position in the lowest (highest) subdecile on ΔXFIN, are also reported. A similar procedure is conducted for all other portfolios on external financing measures, after controlling for all other accrual measures.

Table 5 provides size-adjusted returns for portfolios based on the magnitude of external financing measures, after controlling for accrual measures. In Panel A, we use TACC as a control measure. The difference in size-adjusted returns

[11] In unreported tests, we investigate raw, size-adjusted returns and statistical arbitrage opportunities for hedge portfolios on external financing and accrual measures after taking into account transaction costs (by estimating, as in Hogan et al. (2004) round trip transactions as a percentage of number of stocks held and multiplying it with estimates of round trip transaction costs given in Chan and Lakonishok (1997)). Our findings remain qualitative similar with respect to these procedures.

[12] In unreported tests, we focus on the performance of intersected quintile portfolios from independent sorts on external financing and accrual measures, and find qualitatively similar results. Nevertheless, given the independent nature of the sorts, one could wonder whether the resulted portfolios are equally well-populated, and sufficiently diversified to yield reliable inferences.

Table 5

Size-adjusted returns of portfolios on external financing measures after controlling for accrual measures. The below table presents one-year ahead size-adjusted annual stock returns for portfolios based on the magnitude of external financing measures after controlling for accrual measures. To implement these two-dimensional portfolios for net external financing and total accruals, each year we first sort firms into ten equal-sized portfolios based on total accruals and subsequently sort them into ten equal-sized subportfolios based on net external financing. We then combine together all subportfolios on net external financing of decile rank 1, all subportfolios on net external financing of decile rank 2, etc., and report time-series averages of one-year ahead size-adjusted returns (*t*-statistics in italics) for each of these subdeciles. Time-series averages of one-year ahead size-adjusted returns (*t*-statistics in italics) for hedge portfolios consisting of a long (short) position in the lowest (highest) subdecile on net external financing, are also reported. A similar procedure is conducted for all other portfolios on external financing measures after controlling for all other accrual measures. Panels A, B and C present results for portfolios on external financing measures after controlling for total accruals, working capital accruals and long-term accruals, respectively. External financing and accrual measures are defined in Table 1, while size-adjusted returns in Table 2. *t*-statistics in bold indicate significance at less than 5% level (2-tailed).

	1 (Low)	2	3	4	5	6	7	8	9	10 (High)	Hedge (1−10)
Panel A: Size-adjusted returns of decile portfolios on external financing measures after controlling for total accruals											
ΔXFIN	0.016	0.029	0.029	0.031	0.037	0.023	0.028	0.027	0.019	−0.022	0.038
	1.839	***3.709***	***3.094***	***4.089***	***3.897***	***2.609***	***2.463***	***2.659***	*1.102*	*−0.946*	*1.375*
ΔEQUITY	0.028	0.023	0.019	0.015	0.024	0.036	0.046	0.025	0.008	−0.009	0.037
	3.188	***2.76***	*1.73*	*1.585*	***2.281***	***3.446***	***4.085***	***2.369***	*0.462*	*−0.331*	*1.186*
ΔDEBT	0.012	0.026	0.026	0.035	0.036	0.005	0.023	0.029	0.022	−0.001	0.013
	1.211	***2.671***	***2.633***	***3.509***	***3.725***	*0.638*	***2.1***	***3.302***	*2.014*	*−0.046*	*0.898*
ΔSDEBT	0.005	0.025	0.031	0.036	0.026	0.022	0.018	*0.026*	*0.017*	0.007	−0.002
	0.567	***2.972***	***3.065***	***3.07***	*2.007*	*1.983*	*1.645*	***2.493***	*1.925*	*0.629*	*−0.102*
ΔLDEBT	0.011	0.024	0.035	0.015	0.027	0.021	0.027	0.025	0.021	0.009	0.002
	1.11	***2.543***	***3.762***	*1.523*	***2.603***	*2.01*	***3.201***	***2.913***	*1.879*	*0.797*	*0.171*
Panel B: Size-adjusted returns of decile portfolios on external financing measures after controlling for working capital accruals											
ΔXFIN	0.035	0.039	0.045	0.043	0.039	0.034	0.017	0.017	−0.008	−0.043	0.078
	3.898	***4.786***	***4.733***	***5.653***	***3.104***	***2.763***	*1.781*	*1.424*	*−0.729*	***−2.32***	***3.431***
ΔEQUITY	0.04	0.019	0.014	0.04	0.027	0.042	0.027	0.034	−0.007	−0.02	0.06
	4.774	***2.216***	*1.245*	***3.697***	***2.949***	***4.974***	***2.894***	*2.019*	*−0.513*	*−0.819*	***2.025***
ΔDEBT	0.032	0.039	0.033	0.038	0.03	0.03	0.022	0.021	−0.001	−0.029	0.061
	2.999	***4.604***	***3.044***	***2.291***	***3.047***	***3.339***	***2.299***	*2.005*	*−0.042*	***−2.378***	***4.62***
ΔSDEBT	0.025	0.023	0.031	0.034	0.027	0.022	0.016	0.021	0.011	0.004	0.021
	2.337	***2.955***	***3.437***	***2.454***	*1.825*	*1.936*	***2.034***	*1.865*	*1.123*	*0.452*	*1.676*
ΔLDEBT	0.029	0.032	0.039	0.036	0.034	0.028	0.015	0.012	0.012	−0.024	0.053
	2.942	***3.746***	***4.803***	***2.642***	*2.007*	***2.576***	*1.686*	*1.321*	*1.163*	*−1.933*	***3.763***
Panel C: Size-adjusted returns of decile portfolios on external financing measures after controlling for long-term accruals											
ΔXFIN	0.036	0.023	0.035	0.027	0.03	0.044	0.017	0.021	0.006	−0.022	0.057
	4.429	***3.32***	***4.674***	***3.464***	***3.647***	***4.269***	*1.668*	***2.08***	*0.427*	*−0.908*	*2.011*
ΔEQUITY	0.03	0.023	0.019	0.01	0.038	0.043	0.03	0.032	0.009	−0.018	0.048
	3.762	***2.647***	*1.623*	*1.059*	***3.442***	***4.091***	***2.906***	***2.309***	*0.614*	*−0.686*	*1.583*
ΔDEBT	0.022	0.032	0.027	0.027	0.033	0.021	0.028	0.015	0.016	−0.006	0.028
	2.337	***3.901***	***2.725***	***2.776***	***3.697***	***2.552***	***2.586***	*1.487*	*1.5*	*−0.575*	***2.368***
ΔSDEBT	0.02	0.033	0.019	0.031	0.032	0.029	0.02	0.021	0.009	0.001	0.019
	1.985	***3.788***	*2.012*	***2.551***	***2.485***	***2.452***	***2.13***	*1.866*	*1.051*	*0.091*	*1.641*
ΔLDEBT	0.019	0.026	0.023	0.032	0.01	0.028	0.038	0.019	0.01	0.01	0.009
	1.978	***3.151***	***3.087***	***2.858***	*1.179*	***2.816***	***3.864***	*1.947*	*0.96*	*0.923*	*0.808*

Notes: Bold *t*-statistics indicate significance at less than 5% level (2-tailed). External financing and accrual measures are defined in the note to Table 1, while size-adjusted returns in the note to Table 2.

between the bottom and the top decile portfolio on ΔXFIN is insignificant at 0.038, conditional on TACC. Hedge size-adjusted returns on ΔEQUITY, ΔDEBT, ΔSDEBT and ΔLDEBT are also insignificant, after controlling for TACC. In a similar vein, Dechow et al. (2008) show that after controlling for reinvested earnings (the sum of total accruals and retained cash flows), the size-adjusted return of a hedge decile portfolio on net external financing is an insignificant 0.021. At the same time, we are not aware of other studies focusing on the performance of portfolios on individual external financing activities, after controlling for total accruals.

In Panel B we use CACC as a control measure. Conditional on the level of CACC, the hedge size-adjusted return on ΔXFIN, ΔEQUITY, ΔDEBT is equal to 0.078, 0.06 and 0.061, respectively. Further, after controlling for CACC, the hedge portfolio on ΔSDEBT does not generate significant size-adjusted returns and the hedge portfolio on ΔLDEBT generates significant size-adjusted returns of 0.053. In Panel C, we use NCACC as a conditioning measure. ΔXFIN yield insignificant size-adjusted returns of 0.057, after holding NCACC relatively constant. Conditional on NCACC we also find insignificant size-adjusted returns for hedge portfolios on ΔEQUITY, ΔSDEBT and ΔLDEBT. Only, the hedge return on ΔDEBT is slightly positive and statistically significant: 0.028.

In summary, our conditional firm-level portfolio analysis confirms that the external financing anomaly mainly captures the effects of the anomaly on total accruals. Importantly, our evidence suggests that working capital accruals and long-term accruals have different implications for the external financing anomaly. The link between the anomalies is more likely attributable to long-term accruals. On the other hand, working capital accruals provides an important link only for short-term debt financing activities. These findings are in accordance with evidence in Panel B of Table 1 that net short-term debt financing is more correlated with working capital accruals, while all other external financing measures are more correlated with long-term accruals.

Our findings, after taking also into account prior evidence on the existence of statistical arbitrage opportunities, are consistent with the third hypothesis that the relation between the external financing anomaly and the anomaly on total accruals is driven from misunderstanding of overinvestment by firm executives that is more likely to be recorded on long-term accruals. On the other hand, they do not support the first hypothesis associated with timing-based managerial decisions to exploit mispricing. Finally, for the second hypothesis about misunderstanding of earnings management, the weight of empirical evidence is in favor of a union between working capital accruals and long-term accruals (in the sense that our results support an effect coming only from long-term accruals and not both).

4.4. Regressions on net external financing and accrual measures

In this section, we investigate our hypotheses concerning the relation of external financing and accrual anomalies, by considering Fama and MacBeth (1973) regressions of one-year ahead size-adjusted annual returns on external financing measures, after controlling for accrual measures (size and book to market ratio are included as additional control variables), and report the time-series averages of the resulting parameter coefficients (*t*-statistics in italics). All independent variables are expressed as scaled decile ranks: we rank the values of each measure into deciles (0–9) each year and divide the decile number by 9 so that each firm-year observation related to each measure takes a value ranging between 0 and 1. These are two main advantages of using scaled decile ranks (see Desai, Rajgopal, & Venkatachalam, 2004). First, the slope coefficient can be interpreted as the abnormal return to a zero-investment strategy that takes a long (short) position on firms with high (low) levels of the respective measure. Second, scaled decile ranks control for potential non-linearities and ensure that results are not driven from extreme observations. To investigate the implications of total accruals on the external financing anomaly, we estimate models that take the following forms:

$$\mathrm{SRET}_{t+1} = \gamma_0 + \gamma_1 \mathrm{SIZE}_t + \gamma_2 \mathrm{BVMV}_t + \gamma_3 \Delta\mathrm{XFIN}_t + \gamma_4 \mathrm{TACC}_t + \upsilon_{t+1} \quad \text{(M1)}$$

$$\mathrm{SRET}_{t+1} = \gamma_0 + \gamma_1 \mathrm{SIZE}_t + \gamma_2 \mathrm{BVMV}_t + \gamma_3 \Delta\mathrm{EQUITY}_t + \gamma_4 \Delta\mathrm{DEBT}_t + \gamma_5 \mathrm{TACC}_t + \upsilon_{t+1} \quad \text{(M2)}$$

$$\mathrm{SRET}_{t+1} = \gamma_0 + \gamma_1 \mathrm{SIZE}_t + \gamma_2 \mathrm{BVMV}_t + \gamma_3 \Delta\mathrm{EQUITY}_t + \gamma_4 \Delta\mathrm{SDEBT}_t + \gamma_5 \Delta\mathrm{LDEBT}_t + \gamma_6 \mathrm{TACC}_t + \upsilon_{t+1} \quad \text{(M3)}$$

To investigate the consequences of accrual components on the external financing anomaly, we estimate similar models by replacing total accruals with either working capital accruals or long-term accruals. As expected, when ΔXFIN and accrual measures are included separately in these regression models, coefficients are found both negative and highly statistically significant. In particular, the coefficients on ΔXFIN, TACC, CACC and NCACC are −0.103, −0.121, −0.081 and −0.104, respectively. When we consider only external financing indicators in model 2 (M2), the coefficient on ΔEQUITY is equal to −0.06 and on ΔDEBT is equal to −0.077. Similarly, in model 3 (M3) without considering accrual measures, the coefficients on ΔEQUITY, ΔSDEBT and ΔLDEBT, are −0.061, −0.044 and −0.057, respectively.

In Table 6, we report results from regressions of size-adjusted returns on external financing measures, after controlling for accrual measures. Panel A presents results with TACC as conditioning measure. Consistent with Cohen and Lys (2006), once we control for TACC the coefficients on ΔXFIN, ΔEQUITY and ΔDEBT are both no longer significant. Similar results are reported in the final column for ΔEQUITY, ΔSDEBT and ΔLDEBT. These findings indicate that all external financing measures do not have predictive power for future returns, after controlling for total accruals.

Panel B presents results with CACC as control measure. When ΔXFIN and CACC are considered simultaneously in the regression, the coefficients remain both negative and significant. The coefficient on ΔXFIN is equal to −0.087, while the coefficient on CACC is equal to −0.049. From the second column we see that once we control for CACC the coefficients on both ΔEQUITY and ΔDEBT remain both negative and significant. Similar evidence is reported in the final column for ΔEQUITY, ΔSDEBT and ΔLDEBT. These findings indicate that all external financing measures still predict future returns, after controlling for working capital accruals.

Panel C presents results with NCACC as conditioning measure. When NCACC is included together with ΔXFIN, both measures have negative and significant coefficients. The second column reveals that in the presence of NCACC, the coefficient on ΔEQUITY is no longer significant and the coefficient on ΔDEBT decreases by more than 40% to −0.044 (as compared to −0.077). The final column shows results ΔEQUITY, ΔSDEBT and ΔLDEBT. Once we control for NCACC, the coefficients on ΔEQUITY and ΔLDEBT are no longer significant. The coefficient on ΔSDEBT decreases by more than 30% to −0.03 (as compared to −0.044). These findings indicate that net equity financing and net long-term debt financing do not have predictive power for future returns, after controlling for long-term accruals. The predictive power of net external financing and net debt financing is reduced, but does not totally disappeared due to the short-term debt component.

Table 6
Regressions of size-adjusted returns on external financing measures and total accruals. The table presents results from Fama and MacBeth (1973) regressions of one-year ahead size-adjusted annual returns on external financing measures, after controlling for accrual measures. We estimate annual cross-sectional regressions and report the time-series averages of the parameter coefficients (*t*-statistics in italics). Size (natural logarithm of market capitalization) and book to market ratio (natural logarithm of the ratio of the book value of total equity to the market capitalization), are included as control variables in all regressions. Panels A, B and C present results from regressions on external financing measures after controlling for total accruals, working capital accruals and long-term accruals, respectively.

Panel A: Regressions of size-adjusted returns on external financing measures after controlling for total accruals

$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta XFIN_t + \gamma_4 TACC_t + \upsilon_{t+1}$ (Model 1)
$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta EQUITY_t + \gamma_4 \Delta DEBT_t + \gamma_5 TACC_t + \upsilon_{t+1}$. (Model 2)
$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta EQUITY_t + \gamma_4 \Delta SDEBT_t + \gamma_5 \Delta LDEBT_t + \gamma_6 TACC_t + \upsilon_{t+1}$ (Model 3)

	Model 1	Model 2	Model 3
Intercept	0.077	0.089	0.092
	2.903	***4.057***	***4.117***
SIZE	−0.033	−0.036	−0.036
	−1.571	*−1.793*	*−1.803*
BVMV	0.055	0.053	0.054
	1.559	*1.597*	*1.617*
ΔXFIN	−0.048		
	−1.548		
ΔEQUITY		−0.035	−0.034
		−1.15	*−1.127*
ΔDEBT		−0.021	
		−1.437	
ΔSDEBT			−0.015
			−1.428
ΔLDEBT			−0.014
			−1.003
CACC	−0.086	−0.096	−0.096
	−***2.863***	−***3.719***	−***3.689***

Panel B: Regressions of size-adjusted returns on external financing measures after controlling for working capital accruals

$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta XFIN_t + \gamma_4 CACC_t + \upsilon_{t+1}$ (Model 1)
$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta EQUITY_t + \gamma_4 \Delta DEBT_t + \gamma_5 CACC_t + \upsilon_{t+1}$. (Model 2)
$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta EQUITY_t + \gamma_4 \Delta SDEBT_t + \gamma_5 \Delta LDEBT_t + \gamma_6 CACC_t + \upsilon_{t+1}$ (Model 3)

	Model 1	Model 2	Model 3
Intercept	0.083	0.101	0.111
	2.959	***4.317***	***4.54***
SIZE	−0.047	−0.049	−**0.049**
	−1.903	−***2.282***	−***2.261***
BVMV	0.058	0.058	0.058
	1.622	*1.729*	*1.724*
ΔXFIN	−0.087		
	−***4.296***		
ΔEQUITY		−0.055	−0.055
		−***2.049***	−***2.035***
ΔDEBT		−0.06	
		−***5.253***	
ΔSDEBT			−0.03
			−***3.044***
ΔLDEBT			−0.047
			−***4.875***
CACC	−0.049	−0.053	−0.055
	−***3.13***	−***3.735***	−***3.928***

Panel C: Regressions of size-adjusted returns on external financing measures after controlling for long-term accruals

$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta XFIN_t + \gamma_4 NCACC_t + \upsilon_{t+1}$ (Model 1)
$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta EQUITY_t + \gamma_4 \Delta DEBT_t + \gamma_5 NCACC_t + \upsilon_{t+1}$. (Model 2)
$SRET_{t+1} = \gamma_0 + \gamma_1 SIZE_t + \gamma_2 BVMV_t + \gamma_3 \Delta EQUITY_t + \gamma_4 \Delta SDEBT_t + \gamma_5 \Delta LDEBT_t + \gamma_6 NCACC_t + \upsilon_{t+1}$ (Model 3)

	Model 1	Model 2	Model 3
Intercept	0.073	0.086	0.093
	2.736	***3.906***	***4.153***
SIZE	−0.031	−0.032	−0.032
	−1.483	*−1.63*	*−1.626*
BVMV	0.059	0.058	0.058
	1.672	*1.738*	*1.738*
ΔXFIN	−0.07		
	−***2.526***		
ΔEQUITY		−0.043	−0.042
		−1.444	*−1.387*

Table 6 (*continued*)

Panel C: Regressions of size-adjusted returns on external financing measures after controlling for long-term accruals			
ΔDEBT		−0.044	
		−3.593	
ΔSDEBT			−0.03
			−2.847
ΔLDEBT			−0.025
			−1.631
NCACC	−0.061	−0.067	−0.072
	−2.338	***−2.912***	***−2.896***

Notes: Bold *t*-statistics indicate significance at less than 5% level (2-tailed). External financing and accrual measures are defined in Table 1, while size-adjusted returns and market capitalization in the note to Table 2.

The results from these cross-sectional regressions confirm that the predictability of stock returns associated with external financing activities can be explained away by total accruals. Furthermore, they indicate that this strong relationship is more likely to be driven from long-term accruals and that the overinvestment hypothesis is the most consistent explanation. In addition, the results from these regressions cannot rule out a potentially important role for the earnings management hypothesis, a conclusion similar to the one reached based on our conditional portfolio analysis.

5. Conclusion

The external financing anomaly and the accrual anomaly are well established asset pricing regularities. Recent studies show that the external financing anomaly mainly captures the effect of the accrual anomaly. Such a relation accommodates several underlying driving forces: managerial market timing, earnings management, overinvestment, distress risk and risk induced by changes in the mix of growth options and assets in place. In this paper, we investigate the relation of these well-known market anomalies by focusing separately on working capital accruals and long-term accruals.

Some of our findings confirm much of the evidence in prior studies. Hedge portfolios on measures of net external financing (entire, equity, debt) and on accrual measures (total accruals, working capital accruals, long-term accruals) earn positive raw and size-adjusted returns. Additionally, the anomaly on total accruals simply subsumes the external financing anomaly.

We also present results that are entirely new. When we distinguish between short-term debt financing activities and long-term debt financing activities, we find that hedge portfolios on both measures are profitable. The performance of hedge portfolios on all external financing and accrual measures is robust even after eliminating small firms, although the magnitude of returns is somewhat lower. Importantly, these hedge portfolios constitute statistical arbitrage opportunities. Our findings up to this point, are not be consistent with the risk hypotheses (H4 and H5 in Section 2.1) on the association of external financing and accrual anomalies.

We also find that hedge portfolios on all external financing measures, except net short-term debt financing, generate positive size-adjusted returns after controlling for working capital accruals. On the other hand, hedge portfolios on all external financing measures, except net debt financing, are not profitable after controlling for long-term accruals.

Firm-level cross-sectional regressions indicate that in the presence of working capital accruals, all external financing measures have the ability in predicting future returns. Nevertheless, in the presence of long-term accruals the predictive power of some measures of net external financing (overall, debt, short-term debt) for future returns is reduced substantially, while of other (equity, long-term debt) almost disappears.

Our results that the external financing anomaly and the anomaly on total accruals is mostly driven by long-term accruals, suggest that the overinvestment hypothesis (H3 in Section 2.1) is the most coherent explanation to interpret them. On the other hand, these results do not support the managerial market riming hypothesis (H1 in Section 2.1), since this hypothesis predicts that the relation should be driven uniformly by working capital accruals and long-term accruals. Similarly, for the hypothesis about misunderstanding of earnings management (H2 in Section 2.1) we find that the empirical results again support an effect coming only from long-term accruals and not from both accrual components.

Our study makes at least three contributions to the existing literature. First, it excludes distress risk and risk from real investment policies as factors affecting for the relation between the external financing anomaly and the anomaly on total accruals. Second, it discriminates across other common driving factors. In particular, our findings highlight that investor's misunderstanding of overinvestment plays an important role in explaining this relation, but they show that timing-based managerial decisions do not have explanatory ability for it. Nevertheless, we cannot rule out a possibility that investor's underreaction to overinvestment can be also combined with failure to recognize opportunistic earnings management. Third, it suggests that the predictive ability of different forms of net debt financing (short-term vs. long-term) for future movement in stock prices should not be treated as homogenous across accrual categories.

Our analysis suggests interesting directions for future research. One could investigate whether (and why) all categories of long-term accruals have similar influence on the external financing anomaly. Alternatively, one could focus on the implications of earnings management on the predictability of stock returns following external financing activities, by considering discretionary accruals.

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