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The accrual anomaly – focus on changes in specific unexpected accruals results in new evidence

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accruals results in new evidence.**

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# **The accrual anomaly – focus on changes in specific unexpected accruals results in new evidence.**

## **Abstract:**

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This paper deals with the accrual anomaly first documented by Sloan (1996), i.e. the finding that the stock market prices appear to overweigh the role of accruals persistence and under-weigh the role of operating cash flow persistence. In an analysis based on Danish financial statement data it is demonstrated that different specific components of earnings have significantly different earnings persistence characteristics and that these differences are not fully reflected in share prices.

In the analysis presented here the earnings persistence effect of two particular unexpected accrual components are specifically analyzed, namely the unexpected inventory accrual component and the unexpected accounts receivable accrual component, i.e. changes in accruals not motivated by corresponding changes in company activity-level. Additionally and for comparison, the accounting accruals are split into expected and unexpected accruals, estimated by the extended Jones model like in both some US-analyses and some international studies of the accrual anomaly phenomenon.

It is found that the persistence of earnings is decreasing in the magnitude of the unexpected accrual components of earnings and that the persistence of current earnings performance is particularly decreasing in the magnitude of unexpected changes in inventory. The special accrual parts are related to the perceptions of earnings persistence implicit in the market prices, and it is found that the differences in earnings persistence are not rationally reflected by share price differences.

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*Keywords:* Discretionary accruals; Earnings management; Earnings Persistence; Accrual anomaly

# **The accrual anomaly – focus on changes in specific unexpected accruals results in new evidence.**

## **1. Introduction.**

Sloan (1996) demonstrated that investors in the United States capital markets could have earned abnormal security returns by employing a trading strategy that takes a long position in firms reporting accounting accruals in the highest decile of the cross-sectional distribution of accruals, and a short position in firms reporting accruals in the lowest decile of the distribution. The accrual anomaly appears to stem from an inability of the capital market to recognize differences in persistence between the accrual and cash flow components of earnings; accruals mean-revert at a higher rate than operating cash flows, yet the evidence suggests that the market does not fully appreciate that difference and assigns a weight to accruals in pricing that ignores their lower persistence.

In an almost simultaneous study Subramanyam (1996) used the well-known Jones (1991) model modified by Dechow et al (1995) to separate the accruals into discretionary (or unexpected) and non-discretionary (or expected) accruals<sup>1</sup>. Subramanyam (1996) found that unexpected accruals were associated with contemporaneous stock prices, future earnings and cash flows, and he concluded that managers choose accruals to enhance the informativeness of accounting earnings<sup>2</sup>. He also found that the market prices Jones model-estimated unexpected accruals and that these are positively associated with future profitability. But of course the reliability of his conclusions depends on how well exactly this model separates unexpected and expected accruals.

Xie (2001) used the modified Jones model by separating the accruals into unexpected and expected accruals in order to develop the original Sloan (1996) setting and hereby be able to explain the observed accrual anomaly. Xie found that the lower earnings persistence of abnormal unexpected accruals was primarily due to the role of the unexpected accruals. According to Sun (2003) this was especially the case, when the individual company was in a profitable situation, i.e. when the net earnings figures were positive.

Already McNichols (2000) considered that the observed accrual anomaly might be a question of other not-controllable variables not accounted for in the Sloan settings, and she found that a significant part

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<sup>1</sup> In the past many years there has been some different approaches to the concept, originally introduced by Healy (1985). In Healy (1996) he states that if he were to rewrite that paper, he would have changed the terminology: ‘what I termed “discretionary” accruals would be renamed “unexpected” accruals, and what I called “non-discretionary” earnings would be relabeled as “expected” earnings’, *ibid.* p. 114.

<sup>2</sup> And in accordance with Guay et al (1996) that discretionary accruals are not just pure noise in earnings.

could be attributed to growth. Also she found, later also dealt with by Dumontier & Raffournier (2002), that future progress regarding the accrual anomaly in particular would be most likely to come from applications of specific accruals tests rather than from aggregate accruals tests. Like that, Fairfield et al (2003a) and (2003b) expect accruals to be a component of both profitability and growth in net operating assets, and hereby they improved the models significance level.

Since the accrual anomaly is in conflict with the capital market efficiency hypotheses with respect to accounting information, Pincus et al (2005) made a survey considering the stock markets in 20 different countries and they found that the phenomenon is more likely to occur in countries with a common low legal tradition (US, AUS, CAN and UK), where extensive use of accrual accounting is permitted, where concentration of share ownership is lower, and where the strength of shareholder protection is weaker<sup>3</sup>. LaFond (2005) found in his comparable global investigation of large and developed equity markets that the accrual anomaly is global phenomenon by decomposing the total accruals into specific accounts, like inventory, accounts payable, accounts receivable, etc. in a portfolio context. However, the aim of this study is not a replication of neither the Pincus et al study nor the LaFond study, but to carry the analysis further in separating the accruals part of the earnings into even more detailed parts and then focus on these earnings components, in relation to the persistence of earnings performance. Inspired by the Jones accruals separation technique, unexpected changes in inventory and accounts receivable are identified as the changes not justified by the change in activity measured by the change in sales. Hereafter the relations between the persistence of current earnings and the magnitude of these specific identified unexpected accruals are examined, and hypothesized relations are tested. In the study, we will not go into the discussion of whether abnormal stock returns can be earned by exploiting investors' inability to distinguish correctly between the accrual and cash flow components of earnings.

The remainder of the paper is organized as follows: Section 2 presents, defines and describes the approaches to accrual anomaly tested and used in the paper. Section 3 describes the sample selection and descriptive statistics. Empirical results are provided in Section 4 - the first part concerns persistence and valuation of Jones-based separation of accruals components of earnings, while the last part concerns persistence and valuation of specific separated accruals components of earnings: unexpected changes in inventory, accounts receivable and the remaining other accruals. Section 5 concludes the paper.

## **2. Presentation, definition, calculation and testing the accrual anomaly.**

### **2.1 Approaches to accrual anomaly.**

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<sup>3</sup> The countries which were not classified as common law countries were classified as code law countries. One of the code law countries in the Pincus et al (2005) study is Denmark, and when the present paper was prepared, evidence was found that support the Pincus et al (2005) results regarding the separation of earnings into cash flow and accruals (not presented here).

The basic hypothesis behind the accrual anomaly is that investors fail to appreciate that accruals are less persistent than operating cash flow; i.e. accruals reverse more rapidly than operating cash flows.

Cash flows from operations (CFO) are often thought of as a measure of performance, which is less subject to distortion than is the net earnings figure in accrual accounting settings. This is due to the accrual system itself, since the net earnings numbers are relying on accruals, deferrals, allocations and valuations, all of which involve higher degrees of subjectivity than what enters the determination of CFO. For instance: a relatively high level of net earnings and a correspondingly low level of cash flow may indicate aggressive income recognition or expense accrual criteria leaving relatively more uncertainty than vice versa<sup>4</sup>.

The common theme underlying this reasoning is that the accrual and cash flow components of current earnings have different implications for the assessment of future earnings (and cash flows). While both components contribute to current earnings, current earnings performance is less likely to persist, if it is attributable primarily to the accrual component of earnings as opposed to the cash flow component. Focusing on the persistence of current earnings performance, the persistence could be expected to decrease when the accrual component of the earnings increases relatively and vice versa.

However, this reasoning might be a little too simple. For example, when a company grows, it usually needs to invest in fixed assets and/or working capital, and even though the accruals part (net earnings less CFO) grows, earnings persistence might be high. Therefore, the essential aspect in the above reasoning is to separate lower earnings persistence from higher earnings persistence. In order to do that we need to identify and focus on the relative magnitude of specific accruals that unconditionally leads to relatively lower earnings persistence. Even though in theory this might seem relatively simple and easy to do, this is not straightforward in praxis, and the ultimate question arises: Separate the accruals how?

As discussed in Kothari (2001), a number of models have been used in such settings. In a comparative accruals-models study, Thomas & Zhang (2000) found that in general all other models than the Jones model have not been as popular as a method of separating the accruals part of the net earnings number during the last many years. For this reason, only the extended Jones model (here the company specific time series version) will be considered in this study. The basic idea is for each individual company to divide the accruals into two groups, expected accruals and unexpected accruals. The expected accruals reflect the fundamental development of the company, by focusing on the total assets, sales and property, plant and equipment, while the unexpected accruals reflect the rest (net earnings less CFO and expected

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<sup>4</sup> Similar reasoning was also seen when the international accounting standard, IAS 7, "cash flow statements", was introduced, and in Denmark again when the Danish version of the standard, Regnskabsvejledning no 11 was introduced in the national accounting regulation in May 1996.

accruals). After separation of the accruals, the assumption is that the higher the expected accruals part of the total accruals relatively the more persistent earnings will be relatively.

This reasoning forms the basis for the following testable hypothesis:

**H1:** The persistence of current earnings performance is decreasing in the magnitude of the unexpected accrual component of earnings and is increasing in the magnitude of the cash flow and the expected accruals components of earnings.

The extended Jones model used here, like other models used in the last decade(s) in earnings management, measures the accruals as an aggregated number. During the last few years this practice has been criticized to some extent<sup>5</sup>, since a lot of information then simply nets out. One possibility is to improve the setting following McNichols (2000) by making applications of *specific* accruals tests. One way of doing this could be to separate the accruals into one (or a few) specific accruals and focus on these, leaving the rest of the accruals as a non-conclusive residual.

Also Richardson et al (2004) consider some of the problems with the aggregated models, and they find that the lower persistence of the accrual component is a direct manifestation of the usual experienced trade-off between accounting relevance and reliability. When operationalizing their concern, they state that the reliability can be assessed as low, medium or high, and they present a motivation for this type of hypothesized classification. The keywords are how many subjective estimates would be expected to be involved in the preparation of the financial statements. Their resulting reliability classification (except the one in italics) was:

Accounts receivable	= Low
Inventory	= High ( <i>low</i> )
Other current assets	= Medium
Accounts payable	= High
Other current liabilities	= Medium

As indicated we disagree concerning the reliability of the inventory figures in this setting, for cost allocation issues and also issues regarding need for write down, changes in prices and estimates, as well as simple estimation errors contributed by external economic conditions. All these end-of-period adjustments when preparing the financial statements in accordance to past and present GAAP (present IAS 2, plus also IAS 11 and 18) often involve a large number of uncertain transactions. Consequently, in

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<sup>5</sup> Among others, please see McNichols (2000).

our opinion a more plausible general classification would be “low”, even though it could be quite high in many cases.

Indeed, following IASB standards, assessment and valuation of the two asset accounts, inventory and accounts receivable, usually represent a major challenge for those who prepare and/or audit the financial statements, as well as for those who read, use and analyze them. This is because exactly these two accounts are particularly difficult to assess – how is and how should the value of these assets be estimated? At a *true and fair* value of course, but for instance how can one be able to determine the value of some finished goods which are no longer in the product assortment, which nevertheless is sold (at a profit) from time to time? Based on the Jones model intuition, some of the changes in the magnitude of the inventory and accounts receivable are of course due to the development in the company’s fundamental economics (some expected changes), while other changes are due to revisions in estimates or valuation (some unexpected changes). Unexpected changes could arise for a number of reasons, like following sudden changes in the market product preferences leaving the company with unsaleable products, customers suddenly having financial difficulties, government interference affecting production, product or market situation, etc. Nevertheless, when the company’s activities increase, it should be assumed that inventory and accounts receivable also increase correspondingly. The purpose of the following testable hypotheses is to separate these two accounts into unexpected inventory change and unexpected accounts receivable change, leaving a less interesting residual (net earnings less CFO, and less unexpected changes in inventory and accounts receivable), and focus on these specific accruals measures.

**H2a:** The persistence of current earnings performance is decreasing in the magnitude of the unexpected inventory accruals components of earnings, and vice versa.

**H2b:** The persistence of current earnings performance is decreasing in the magnitude of the unexpected accounts receivable accruals components of earnings, and vice versa.

## **2.2 Calculation of metrics.**

In preparation for testing the two presented hypotheses, the different accruals-related measures are calculated by use of information from the balance sheet and income statement rather than from the statement of cash flows, as it ensures a complete and stringent dataset – the (older) cash flow statement data are less complete than balance sheet and income statement data. The definitions follow those of Subramanyam (1996) and later studies:

$$TAC_t = (\Delta CA_t - \Delta Cash_t - \Delta CL_t + \Delta STDEBT_t - Depr_t)$$

$$Earn_t = CFO_t + TAC_t$$

where	$TAC_t$	= change in total accruals in year t,
	$\Delta Cash_t$	= change in cash between year t-1 and year t,
	$\Delta CA_t$	= change in current assets between year t-1 and year t, (which can be separated into changes in inventory ( $\Delta INV_t$ ), changes in accounts receivable ( $\Delta AR_t$ ) and changes in other current assets ( $\Delta OCA_t$ ) between year t-1 and year t)
	$\Delta CL_t$	= change in current liabilities between year t-1 and year t,
	$\Delta STDEBT_t$	= change in debt in current liabilities between year t-1 and year t,
	$Depr_t$	= depreciation in year t,
	$Earn_t$	= net earnings in year t,
	$CFO_t$	= cash flow from operations in year t,

In this setting, although TAC might be a quite small net number with some persistence qualities, the components in the relation above might be very large gross numbers with significantly different persistence qualities. This is the main motivation for going into details with the specific, manageable accruals-components, change in inventory size. This will be done in two different ways: **First** by use of the extended Jones model to separate the accruals into expected and unexpected accruals. **Second** by separating the accruals into not expected inventory change, not expected accounts receivable change and other accruals, i.e. the reminder.

Applying the extended Jones approach, the idea was originally (see Jones, 1991) to examine whether a company managed its earnings in situations where earnings management could be anticipated. In this setting, however, earnings management is related to the extent to which accruals are *not* well explained by earnings adjusted for changes in activity-level as measured by sales, receivables and property, plant and equipment, whether this misspecification is due to discretionary or non-discretionary behavior. In order to estimate non-expected or abnormal accruals using the extended Jones model, first the expected or normal accruals are determined by the following OLS regression for each of the firms with at least 8 firm-years is estimated<sup>6,7</sup>.

<sup>6</sup> The numbers of firm-years in the sample are on average 13.6 years distributed as follows: 103 companies have data from 13 years or more, 8 have data from 12 years, 6 have data from 11 years and 32 companies have data from 9 years or less.

<sup>7</sup> Consistent with prior literature and throughout this paper, all variables are scaled by lagged total assets.

$$TAC_t = \alpha(1/TA_{t-1}) + \beta_1((1+k)\Delta Sales_t - \Delta AR_t) + \beta_2 PPE_t + \beta_3 LagTA_t + \varepsilon_t$$

where      LagTA<sub>t</sub>      = total assets at the beginning of year t,  
               ΔSales<sub>t</sub>      = change in sales between year t-1 and year t,  
               PPE<sub>t</sub>        = gross value of property, plant and equipment in year t.

The parameter k expresses how the change in sales is mapped into a change in accounts receivable, and it is estimated at 0.5886 by use of the following regression:  $\Delta AR = \alpha + k\Delta Sales$

The specific parameter estimates obtained from the equation above are used to separate the accruals into a firm-specific normal expected accruals part, EXACC<sub>t</sub>, while the remaining is used for estimating, the non-expected or abnormal accruals in year t as the difference between the expected and the total accruals, UNACC<sub>t</sub> = TAC<sub>t</sub> - EXACC<sub>t</sub>

These unexpected accruals (UNACC) are generally interpreted as the influence management has had on preparing the financial statements, since they represent the part of the total accruals which cannot be explained by the natural development in some key accounting items. But whether management has actually managed the unexpected accruals (and thereby also the earnings) due to what ever might be the reason cannot be concluded. And in this context it is also uninteresting. What is important is the separation of the accruals in two parts, one part: the expected accruals representing what could be anticipated based on the firm's normal economic development and another part: the unexpected part of the accruals representing what is not foreseen.

In order to operationalize hypothesis H1 for test purposes, the starting point following Sloan (1996) and later studies is the relation between current earnings performance and future earnings performance:

$$(1) \quad Earn_{t+1} = \gamma_0 + \gamma_1 Earn_t + \varepsilon_{t+1}$$

Hereafter, the hypothesis H1 predicts that equation (1) is misspecified, because it constrains the coefficients on the cash and the two accrual components to be equal. The specification implied by the hypothesis is that a better model is:

$$(2) \quad Earn_{t+1} = \gamma_0 + \gamma_1 CFO_t + \gamma_2 EXACC_t + \gamma_3 UNACC_t + \varepsilon_{t+1}$$

where  $\gamma_3 < \gamma_2$  and  $\gamma_3 < \gamma_1$ . The smaller coefficient on the unexpected accruals relative to expected accruals and cash flow respectively reflects the lower persistence of earnings performance attributable to the unexpected accrual component of earnings.

Based on the intuition stating that the specific accruals inventory and accounts receivable are assumed relatively less reliable, the focus in the following will be on these two. Assuming (inspired by Jones) that development in activity can be measured by using the development in sales as a proxy; the unexpected change in inventory can be estimated:

$$\text{res}\Delta\text{INV}_t = \text{INV}_t - (\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1} * \text{INV}_{t-1}$$

Similarly the unexpected change in accounts receivable can be estimated:

$$\text{res}\Delta\text{AR}_t = \text{AR}_t - (\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1} * \text{AR}_{t-1}$$

Calculation of the two unexpected special accruals and subtracting them and CFO from the net earnings number leaves a residual, which will be named other accruals (otherACC).

Analogously to hypothesis H1, the hypotheses H2a and H2b predict that equation (1) is misspecified, because it constrains the coefficients on the cash and the three accrual components to be equal. The specification implied by the hypothesis is:

$$(3) \quad \text{Earn}_{t+1} = \gamma_0 + \gamma_1\text{CFO}_t + \gamma_2\text{res}\Delta\text{INV}_t + \gamma_3\text{res}\Delta\text{AR}_t + \gamma_4\text{otherACC}_t + \varepsilon_{t+1}$$

where  $\gamma_2$  and  $\gamma_3$  are smaller than  $\gamma_1$  and  $\gamma_4$ . The smaller coefficient on the two unexpected accruals measures relatively to other accruals and cash flow reflect the lower persistence of earnings performance attributable to the two unexpected accrual component of earnings.

### **2.3 Testing procedure.**

Mishkin (1983) develops a framework to test whether investors appear to rationally price publicly available information. Following Sloan (1996), based on the initial work by Mishkin (1983), these hypotheses concern whether stock prices reflect the different properties of the accrual and cash flow components of earnings. Both total accruals and accruals separated in components will be considered. The tests employ the framework developed by Mishkin to test rational expectations hypotheses in macro-econometrics<sup>8</sup>. The framework starts from the basic implication of market efficiency that abnormal returns are zero in expectation. This means that only unanticipated changes in variables

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<sup>8</sup> See Mishkin (1983) for details of the estimation procedure, including formal proofs of all properties of the procedure that are stated in this paper.

relevant for the pricing of a security should be correlated with abnormal returns,  $RET_{t+1}$ . In the present context, the value relevant variable is earnings performance, and the unanticipated changes are expressed by the earnings response coefficient ( $\beta$ ) and a stochastic error term ( $v_{t+1}$ ). The model is estimated using the specifications of the earnings equation in (1), (2) and (3). Combining the earnings forecasting model in equation (1) with the rational pricing model provides the following system:

$$(1a) \quad \text{Earn}_{t+1} = \gamma_0 + \gamma_1 \text{Earn}_t + \varepsilon_{t+1}$$

$$(1b) \quad \text{RET}_{t+1} = \beta(\text{Earn}_{t+1} - \gamma_0 - \gamma_1^* \text{Earn}_t) + v_{t+1}$$

Market efficiency imposes the constraint that  $\gamma_1 = \gamma_1^*$ . This constraint requires that stock prices correctly anticipate the average persistence of earnings performance.

Equation (1a) is a forecasting equation that estimates the forecasting coefficients ( $\gamma$ s) of the different specified earnings components for predicting one-year-ahead earnings. Equation (1b) is a valuation equation that estimates the valuation coefficients ( $\gamma^*$ s) that the market assigns to the very same different specified earnings components. As shown in Mishkin (1983), the two equations can be estimated jointly by using an iterative generalized non-linear least squares estimation procedure, proceeding in two stages. In the first stage the equations (1a) and (1b) are estimated without imposing any constraints on  $\gamma^*$ s and  $\gamma$ s. To test whether the valuation coefficients ( $\gamma^*$ s) are significantly different from their counterpart forecasting coefficients ( $\gamma$ s) obtained in the first stage, the two equations (1a) and (1b) are estimated jointly in the second stage after imposing the rational pricing constraints,  $\gamma_q = \gamma_q^*$  (here  $q = 1$ ). Mishkin shows that the following likelihood ratio statistic is asymptotically  $\chi^2(q)$  distributed under the null hypothesis that the market rationally prices one or more earnings components with respect to their associations with one-year-ahead earnings:

$$2n \log(\text{SSR}^c / \text{SSR}^u),$$

where

$q$  = the number of rational pricing constraints imposed,

$n$  = the number of sample observations

$\log$  = natural logarithm operator,

$\text{SSR}^c$  = the sum of squared residuals from the constrained regressions in the second stage,

$\text{SSR}^u$  = the sum of squared residuals from the unconstrained regressions in the first stage.

### 3. Sample selection and descriptive statistics.

The accounting data are mainly retrieved from the database “Account Data”, owned by the Copenhagen Business School, and supplemented by some official financial statements published by the individual firms. Minor adjustments to the figures in this database are made in order to improve the comparability, where the Danish authorities allow different accounting practices. The sample consists of all non-financial Danish firms listed on the Copenhagen Stock Exchange during the period from 1983 to 2002, available in the “Account Data” database. The sample is restricted to firms with complete data for earnings, assets and other relevant balance sheet items for at least 8 years in a row. All financial statements are in accordance with Danish legislation, which again is in accordance with all EU-directives (the 4<sup>th</sup> EU-directive was adapted in the Danish legislation in 1981).

This yields a sample of 2,020 firm-years, for 149 firms.

**\*\*\* Insert Table 1 \*\*\***

Panel A of Table 1 provides descriptive statistics for the sample. Net earnings and operating cash flows are positive in over 80% of the sample. There appears to be a slight bias towards profitable firms, since the median appears larger than the mean, probably due to the sample selection criteria. As expected, average total accruals are negative due to depreciation expenses. The unexpected accruals component and the expected accruals component are both more variable than total accruals. The standard deviations of all the introduced accruals are higher than that of net earnings (0.0822).

The return,  $RET_t$ , then expresses the buy-and-hold return (like Subramanyam (1996) not size adjusted) over 12 months adjusted for the market return in the same period. Following Xie (2001) and Subramanyam (1996), when calculating the returns, the return window is shifted 3 months relatively compared to the company financial year, i.e. when the company’s financial year goes from month 1 to 12 (both included), then the analogously return interval will be from month 4 to 15 (both included).

Panel B of Table 1 reports contemporaneous correlations between the various earnings components introduced. The panel presents a matrix of mean (median) firm-specific Pearson correlation coefficients. It is seen that net earnings are positively correlated with each of its components. This is not surprising since the net earnings are merely an aggregation of its components. Operating cash flows and total accruals are negatively correlated with a mean (median) correlation of -0.3269 (-0.1594) which is consistent with the evidence in Dechow (1994), indicating the application of matching principle under accrual accounting and/or the presence of earnings management. The correlation between operating cash flows and unexpected accruals has the same sign as that between operating cash flows and expected accruals. The correlation between unexpected inventory change and the other earnings components is

somewhat the opposite of what was expected, which indicate that possible discretionary behavior on average does not include managing the inventory. The reported negative correlation between discretionary accruals and nondiscretionary accruals, the mean (median) correlation is -0.3594 (-0.7248), represents the average of the firm-specific correlations over time.

## 4. Results of testing the hypotheses.

### 4.1 Persistence and valuation when testing the hypothesis H1.

When testing the hypothesis H1, the starting point is estimation of equation (1) since this is the implied basis for the validation of the hypothesis specification. The result of OLS estimation is  $\gamma_1 = 0.379$ . The t-statistic concerning  $\gamma_1$  of 18.56 rejects the null hypothesis that earnings performance is purely transitory (i.e.  $\gamma_1 = 0$ ). The result is in line with the results of earlier US-studies that indicate that accounting earnings (scaled by total assets) are mean reverting with an average persistence parameter  $\gamma_1$ , of approximately 0.4.

The left part of Panel A, Table 2, provides parameter estimates for equation (2), which does not constrain the persistence coefficients on the expected and unexpected accruals and also the cash component of earnings to be equal. An F-test rejects the hypothesis that the coefficients are equal ( $F = 5.79$ ) on a 1% significance level.

The Mishkin (1983) approach is employed to examine whether the market rationally prices different earnings components with respect to their one-year-ahead earnings implications, i.e. our hypothesis H1. Specifically the above equation (2) is put into the Mishkin framework, and the following regression system is to be estimated:

$$(2a) \quad \text{Earn}_{t+1} = \gamma_0 + \gamma_1 \text{CFO}_t + \gamma_2 \text{EXACC}_t + \gamma_3 \text{UNACC}_t + \varepsilon_{t+1}$$

$$(2b) \quad \text{RET}_{t+1} = \alpha + \beta(\text{Earn}_{t+1} - \gamma_0 - \gamma^*_1 \text{CFO}_t - \gamma^*_2 \text{EXACC}_t - \gamma^*_3 \text{UNACC}_t) + v_{t+1}$$

All variables are defined as before. In the setting, equation (2a) is a forecasting equation, estimating forecasting coefficients ( $\gamma$ s) of unexpected accruals and other earnings components for forecasting one-year-ahead earnings. Equation (2b) is a valuation equation, estimating forecasting coefficients ( $\gamma^*$ s) that the market assigns to unexpected accruals and other earnings components. Equation (2a) and (2b) are estimated jointly (as in Mishkin, 1983) using an iterative generalized non-linear least squares estimation procedure.

In the first stage the equations (2a) and (2b) are estimated without imposing any constraints on  $\gamma^*$ s and  $\gamma$ s. To test whether the valuation coefficients ( $\gamma^*$ s) are significantly different from their counterpart forecasting coefficients ( $\gamma$ s) obtained in the first stage, the two equations (2a) and (2b) are estimated jointly in the second stages after imposing the rational pricing constraints,  $\gamma_q = \gamma^*_q$  ( $q = 1, 2, \text{ and/or } 3$ ). The likelihood ratio statistic,  $2n \log(\text{SSR}^c/\text{SSR}^u)$ , is calculated, and  $\chi^2(q)$  statistics are found.

**\*\*\* Insert Table 2 \*\*\***

Table 2 presents results of these relations. The Mishkin test suggests that the market acts as if it assigns relatively larger valuation coefficients to abnormal accruals relative to their forecasting coefficient. Panel A of Table 2 reports the coefficient estimates for equations (2a) and (2b) obtained in the first stage<sup>9</sup>. In general the  $\gamma^*$ s are very different from the corresponding  $\gamma$ s, suggesting that the market estimates the valuation coefficients relatively different to their ability to forecast one-year-ahead earnings. For cash from operations, the valuation coefficient ( $\gamma^*_1 = 0.0061$ ) is smaller than the corresponding forecasting coefficient ( $\gamma_1 = 0.0220$ ), suggesting that the market underprices cash from operations relative to its ability to forecast one-year-ahead earnings. To test whether this underpricing is statistically significant, the equations (2a) and (2b) are estimated again in the second stage after imposing the rational pricing constraint (i.e.  $\gamma_1 = \gamma^*_1$ ). The likelihood ratio statistic of 5.31 reported in Panel B of Table 2 is significant at the 5% level, indicating that the underpricing of cash from operations ( $\gamma^*_1 < \gamma_1$ ) is statistically significant. Panel A of Table 2 shows that the valuation coefficients which the markets assigns to expected accruals ( $\gamma^*_2$ ) and unexpected accruals ( $\gamma^*_3$ ) are 0.0169 and 0.1105 respectively, and these coefficients are different from their forecasting counterparts,  $\gamma_2 = 0.0121$  and  $\gamma_3 = -0.0138$ . Panel B of Table 2 reports that the likelihood ratio statistics reject the null hypotheses of rational pricing of expected accruals ( $p < 5\%$ ) and unexpected accruals ( $p < 5\%$ ). This is the same as the market significantly overprices both expected ( $\gamma^*_2 > \gamma_2$ ) and unexpected accruals ( $\gamma^*_3 > \gamma_3$ ). The likelihood ratio statistic of 23.16 rejects the null hypothesis that the market rationally prices *all* three earnings components ( $p < 5\%$ ). However, the coefficients in equation (2a) and (2b), the  $\gamma$ s and the  $\gamma^*$ s are all pair wise statistically different (on a 5% level), and the market assigns relatively larger coefficients to the two accruals components, especially the unexpected accruals, suggesting that investors do not fully anticipate the relatively lower earnings persistence when estimating the valuation coefficients. This supports and confirms hypothesis H1.

In summary, the Mishkin test results indicate that unexpected accruals are the relatively least persistent component, whereas cash from operations is the most persistent of the three earnings components. This

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<sup>9</sup> Coefficient estimates for  $\alpha$ ,  $\beta$ , and  $\gamma_0$  are not reported because they have no bearing on the market pricing of earnings components.

suggests that the lack of persistence of total accruals Sloan (1996) documents is primarily due to the lack of persistence related to the unexpected accruals. Since the Mishkin test is a statistical comparison between the market's assessment of the persistence of earnings components (as reflected in its valuation of earnings components by  $\gamma^*_1$ ,  $\gamma^*_2$  and  $\gamma^*_3$ ) and the historical persistence of earnings components (as reflected in their association with one-year-ahead earnings by  $\gamma_1$ ,  $\gamma_2$ , and  $\gamma_3$ ), the Mishkin test results further suggest that the market in general (in absolute terms) underestimates the persistence of and in particular underprices cash from operations. In contrast, the market relatively overestimates the persistence of and thus overprices both normal and especially abnormal accruals.

#### **4.2 Persistence and valuation when testing the hypotheses H2a and H2b.**

Completely parallel to the testing of hypothesis H1, the starting point for the validation of the hypotheses H2a and H2b is the estimation of equation (1). The left part of Panel A, Table 3, provides parameter estimates for equation (3), which does not constrain the persistence coefficients on the expected and unexpected accruals and also the cash component of earnings to be equal. An F-test rejects the hypothesis that the coefficients are equal ( $F = 5.93$ ) on a 1% significance level.

Again, the Mishkin framework is utilized, and our hypotheses H2a and H2b are tested by reformulating the above equation (3) to the following regression system, which subsequently is estimated:

$$(3a) \quad \text{Earn}_{t+1} = \gamma_0 + \gamma_1 \text{CFO}_t + \gamma_2 \text{res}\Delta \text{INV}_t + \gamma_3 \text{res}\Delta \text{AR}_t + \gamma_4 \text{otherACC}_t + \varepsilon_{t+1}$$

$$(3b) \quad \text{RET}_{t+1} = \alpha + \beta (\text{Earn}_{t+1} - \gamma_0 - \gamma^*_1 \text{CFO}_t - \gamma^*_2 \text{res}\Delta \text{INV}_t - \gamma^*_3 \text{res}\Delta \text{AR}_t - \gamma^*_4 \text{otherACC}_t) + v_{t+1}$$

All variables are defined as previously. In the setting, equation (3a) is the forecasting equation, estimating forecasting coefficients ( $\gamma$ s) of unexpected changes in inventory accrual and unexpected changes in accounts receivable accruals, and also other earnings components for forecasting one-year-ahead earnings. Equation (3b) is the valuation equation, estimating forecasting coefficients ( $\gamma^*$ s) that the market assigns to the very same earnings components. Equation (3a) and (3b) are estimated jointly using an iterative generalized non-linear least squares estimation procedure.

In the first stage, the equations (3a) and (3b) are estimated without imposing any constraints on  $\gamma^*$ s and  $\gamma$ s. To test whether the valuation coefficients ( $\gamma^*$ s) are significantly different from their counterpart forecasting coefficients ( $\gamma$ s) obtained in the first stage, the two equations (3a) and (3b) are estimated jointly in the second stages after imposing the rational pricing constraints,  $\gamma_q = \gamma^*_q$  ( $q = 1, 2, 3$ , and/or 4). The likelihood ratio statistic,  $2n \log(\text{SSR}^e/\text{SSR}^u)$ , is calculated, and  $\chi^2(q)$  statistics are found.

**\*\*\* Insert Table 3 \*\*\***

Table 3 provides results of the relations. Panel A of Table 3 reports the coefficient estimates for equations (3a) and (3b) in the first stage. In absolute terms, all the valuation coefficients are remarkably lower than their forecasting counterparts, which might be a consequence of other factors relevant for the valuations being omitted. Having individual valuation coefficients that are smaller than the corresponding forecasting coefficients suggests that the market underprices the component relative to its ability to forecast on-year-ahead earnings. As shown in Panel B in Table 3 all these underpricings are statistically significant. However, the estimated coefficients in (3a) and (3b) are all statistically different on a 5% level, suggesting that the relative assignment the market assesses to the different earnings components is relevant. The general observation is  $\gamma_i > \gamma^*_i$ , which leads to the underpricing conclusion, especially regarding the unexpected changes in accounts receivable component, where 0.1349 (valuation) is significantly lower than 0.3423 (forecasting), i.e. changes in accounts receivable which cannot be explained directly by the change in activity measured by the change in sales. The market underprices everything relative to its ability to forecast one-year-ahead earnings – and all is statistically significant (the rational pricing of the earnings components are always rejected). Corresponding construction can be made, but with opposite conclusion regarding the highly valued unexpected inventory change which cannot be explained directly by the change in activity measured by the change in sales. This is especially interesting since the outside analyst does not know whether this change in unexpected inventory change will lead to a better company performance in future period(s), or whether it is simply due to poor management decisions or a high level of low profit inventory items.

Concerning the unexpected changes in inventory the results support the hypothesis H2a, while the magnitude of the unexpected changes in accounts receivable rejects the hypothesis H2b. This has two implications; first: in relation to earnings persistence and valuation the most important earnings component in the widely used Jones-model is the development in inventory and; second: in more contextual approaches to accruals and earnings persistence there is evidence that inventory is a very important specific accrual to study further.

In summary, the Mishkin test results indicate that unexpected changes in inventory accruals are the relatively most persistent component of the four earnings components. This suggests that the lack of persistence of total accruals might be due primarily to the lack of persistence of unexpected inventory change accruals. Since the Mishkin test is a statistical comparison between the market's assessment of the persistence of earnings components (as reflected in its valuation of earnings components by  $\gamma^*_1$ ,  $\gamma^*_2$ ,  $\gamma^*_3$ , and  $\gamma^*_4$ ) and the historical persistence of earnings components (as reflected in their association with one-year-ahead earnings by  $\gamma_1$ ,  $\gamma_2$ ,  $\gamma_3$ , and  $\gamma_4$ ), the Mishkin test results further suggest that the market in

general (in absolute terms) underestimates the persistence of and in particular underprices cash from operations and unexpected changes in accounts receivable. In contrast, the market relatively overestimates the persistence of and thus overprices both unexpected inventory changes and other accruals, although the market appears to relatively overprice unexpected inventory accruals to a greater extent than it does to other accruals.

Consequently, stock prices do not appear to anticipate rationally the relatively lower persistence of earnings performance attributable to the unexpected change in inventory accrual components of earnings, and investors appear to treat the inventory and other accrual components as if they are more persistent.

## **5. Summary and conclusion.**

The main contribution to the literature on the accrual anomaly and related topics is that the evidence in the paper supports two aspects with respect to earnings persistence. The first aspect is that the persistence of current earnings performance is decreasing in the magnitude of the unexpected accrual component of earnings, where the unexpected accruals are obtained by using the Jones model. The findings in this study also confirm the Sloan (1996), Xie (2001) and Sun (2003) findings that investors fail fully to anticipate the lower (higher) persistence of earnings performance attributable to the accrual (CFO) component of earnings.

More important, however, is the second aspect: the persistence of current earnings performance is even more decreasing in the magnitude of unexpected changes in inventory (i.e. changes not justified by the change in activity, measured by change in sales). And evidence is provided indicating that concerning unexpected changes in accounts receivable (i.e. changes not justified by the change in activity, measured by change in sales), the opposite relation was found, telling that the market assigns relatively less importance to unexpected changes in the accounts receivable. The results also suggest that the cash flow component in general is relatively less persistent than the other earnings components.

Summarizing, it was found that the splitting of the net earnings figure into different earnings components, like cash flow and some specific accruals measures, provides notable high valuable additional new insight, when the earnings persistence is questioned and evaluated.

## **Literature.**

Dechow, P. (1994): *Accounting earnings and cash flows as measures of firm performance: the role of accounting accruals*, Journal of Accounting and Economics (17), pp. 3 - 42

Dechow, P.; Richardson, S.A.; and Tuna, I. (2003): *Why are earnings kinky? An examination of the earnings management explanation*, Review of Accounting Studies (8), pp. 355 - 384

Dechow, P.; Sloan, R.G.; Sweeney, A.P. (1995): *Detecting earnings management*, Accounting Review (April), pp. 193 - 225

Dumontier, P.; Raffournier, B. (2002): *Accounting and capital markets: a survey of the European evidence*, European Accounting Review (11:1), pp. 119 – 151

Fairfield, P.M.; Whisenant, J.S.; Yohn, T.L. (2003a): *Accrued earnings and growth: implications for future profitability and market mispricing*, Accounting Review (January), pp. 353 - 371

Fairfield, P.M.; Whisenant, J.S.; Yohn, T.L. (2003b): *The differential persistence of accruals and cash flows for future operating income versus future profitability*, Review of Accounting Studies (8), pp. 221 - 243

Guay, W.R.; Kothari, S.P.; Watts, R.L. (1996): *A market-based evaluation of discretionary accrual models*, Journal of Accounting Research (Supplement), pp. 83 - 105

Healy, P. (1985): *The effect of bonus schemes on accounting decisions*, Journal of Accounting and Economics (7), pp. 85 – 107

Healy, P. (1996): *Discussion of a market-based evaluation of discretionary accrual models*, Journal of Accounting Research (Supplement), pp. 107 – 115

Jones, J. (1991): *Earnings management during import relief investigations*, Journal of Accounting Research (Autumn), pp. 193 – 228

Kothari, S.P. (2001): *Capital market research in accounting*, Journal of Accounting and Economics (31), pp. 105 – 231

LaFond, R. (2005): *Is the accrual anomaly a global anomaly*, Working paper, MIT Sloan School of Management

Liu, Q.; and Qi, R. (2004): *Information and accruals strategy: when does the market mis-price accruals?*, Working paper, University of Hong Kong

McNichols, M.F. (2000): *Research design issues in earnings management studies*, Journal of Accounting and Public Policy (19), pp. 313 – 345

Mishkin, F.S. (1983): *A rational expectations approach to macroeconometrics: testing policy effectiveness and efficient markets models*, University of Chicago Press for the National Bureau of Economic Research

Pincus, M.; Rajgopal, S.; Venkatachalam, M. (2005): *The accrual anomaly: international evidence*, Working paper, University of Iowa

Richardson, S.A.; Sloan, R.G.; Soliman, M.T.; Tuna, I. (2005): *Accrual reliability, earnings persistence and stock prices*, Journal of Accounting and Economics (September), pp. 437 - 485

Sloan, R.G. (1996): *Do stock prices fully reflect information in accruals and cash flows about future earnings?*, Accounting Review (July), pp. 289 - 315

Subramanyam, K.R. (1996): *The pricing of discretionary accruals*, Journal of Accounting and Economics (22), pp. 249 - 281

Sun, Y. (2003): *Analysis of accrual mispricing*, Working paper, Washington University

Thomas, J.; Zhang, X. (2000): *Identifying unexpected accruals: a comparison of current approaches*, Journal of Accounting and Public Policy (19), pp. 347 – 376

Xie, H. (2001): *The mispricing of abnormal accruals*, Accounting Review (July), pp. 357 - 373

**Table 1: Descriptive statistics and correlations among earnings, cash flow from operations and accruals****Panel A:** *Descriptive statistics.*

	<u>Variable</u>	<u>Mean</u>	<u>Std.dev.</u>	<u>Median</u>	<u>Min.</u>	<u>Max.</u>	<u>% positive</u>
Net earnings	Earn	0.0483	0.0803	0.0498	-0.6053	0.7538	85.0%
Cash flow from operations	CFO	0.0699	0.3838	0.0863	-9.4224	2.0485	82.6%
Total accruals	ACCR	-0.0216	0.3171	0.0019	-3.4362	8.9543	39.6%
Expected accruals	EXACC	0.0328	0.2967	0.0140	-1.6119	8.8019	66.5%
Unexpected accruals	UNACC	-0.0262	0.1456	-0.0136	-2.4686	1.1917	39.6%
Unexpected inventory change accruals	resΔINV	-0.0005	0.1151	0.0000	-1.5760	1.4487	46.0%
Unexpected accounts receivables change accruals	resΔAR	-0.0004	0.1044	-0.0001	-1.7173	2.3482	47.3%
Other accruals (the remaining)	otherACC	-0.0207	0.4102	-0.0372	-4.5011	9.4457	29.9%
Buy-and-hold return	RET	0.0171	0.4473	0.0000	-3.5553	3.5008	49.5%

**Panel B:** *Contemporaneous correlations based on mean (median) firm-specific correlations.*

	<u>Earn</u>	<u>CFO</u>	<u>ACCR</u>	<u>EXACC</u>	<u>UNACC</u>	<u>resΔINV</u>	<u>resΔAR</u>	<u>otherACC</u>	<u>RET</u>
Earn									
CFO	0.5422 (0.6816)								
ACCR	0.0255 (0.0039)	-0.3269 (-0.1594)							
UNACC	-0.1945 (-0.1604)	-0.0906 (0.1004)	0.2195 (-0.0429)						
EXACC	0.1351 (0.2378)	-0.2611 (-0.2263)	0.8315 (0.3399)	-0.3594 (-0.7248)					
resΔINV	0.0948 (0.0005)	-0.0865 (-0.2497)	0.0689 (0.1645)	-0.2976 (-0.2371)	0.2353 (0.4385)				
resΔAR	-0.0191 (-0.0299)	-0.1011 (-0.1804)	-0.1074 (-0.0708)	-0.4730 (-0.3705)	0.1666 (0.2932)	0.6760 (0.1519)			
otherACC	-0.0486 (0.1086)	-0.7545 (-0.5000)	0.3934 (0.1795)	0.2027 (-0.0826)	0.2608 (0.3514)	-0.3045 (0.2862)	-0.3617 (0.0701)		
RET	0.5059 (0.5943)	0.3333 (0.4108)	0.0182 (0.0128)	0.0719 (-0.1165)	-0.0235 (0.0462)	-0.0479 (-0.0863)	-0.1806 (-0.2242)	-0.0165 (0.0859)	

All variables are defined in the text.

**Table 2: Non-linear generalized least squares estimation (the Mishkin test) of the market pricing of cash from operations, expected and unexpected accruals with respect to their implications for one-year-ahead earnings.**

**Panel A:** *Market pricing of earnings components with respect to their implications for one-year-ahead earnings.*

Eq. (2a)  $Earn_{t+1} = \gamma_0 + \gamma_1 CFO_t + \gamma_2 EXACC_t + \gamma_3 UNACC_t + \varepsilon_{t+1}$

Eq. (2b)  $RET_{t+1} = \alpha + \beta(Earn_{t+1} - \gamma_0 - \gamma^*_1 CFO_t - \gamma^*_2 EXACC_t - \gamma^*_3 UNACC_t) + v_{t+1}$

Variable	----- Forecasting coefficients -----				----- Valuation coefficients -----			
	Parameter	Estimate	Asymptotic Std.Error	p-value	Parameter	Estimate	Asymptotic Std.Error	p-value
CFO	$\gamma_1$	0.0220	0.0051	0.0000	$\gamma^*_1$	0.0061	0.0171	0.7234
EXACC	$\gamma_2$	0.0121	0.0065	0.0627	$\gamma^*_2$	0.0169	0.0219	0.4402
UNACC	$\gamma_3$	-0.0138	0.0125	0.2675	$\gamma^*_3$	0.1105	0.0429	0.0101

**Panel B:** *Tests of rational pricing of earnings components.*

Variable	Null Hypothesis	Likelihood Ratio Statistic. ( $\chi^2$ )	Marginal significance level
CFO	$\gamma_1 = \gamma^*_1$	5.307	0.0212
EXACC	$\gamma_2 = \gamma^*_2$	3.913	0.0479
UNACC	$\gamma_3 = \gamma^*_3$	18.571	0.0000
All	$\gamma_q = \gamma^*_q$	23.157	0.0000

---

All variables are defined in the text.

**Table 3:** Non-linear generalized least squares estimation (the Mishkin test) of the market pricing of cash from operations, expected and unexpected accruals with respect to their implications for one-year-ahead earnings.

**Panel A:** Market pricing of earnings components with respect to their implications for one-year-ahead earnings.

Eq. (3a)  $Earn_{t+1} = \gamma_0 + \gamma_1 CFO_t + \gamma_2 res\Delta INV_t + \gamma_3 res\Delta AR_t + \gamma_4 otherACC_t + \varepsilon_{t+1}$

Eq. (3b)  $RET_{t+1} = \alpha + \beta(Earn_{t+1} - \gamma_0 - \gamma^*_1 CFO_t - \gamma^*_2 res\Delta INV_t - \gamma^*_3 res\Delta AR_t - \gamma^*_4 otherACC_t) + v_{t+1}$

Variable	----- Forecasting coefficients -----				----- Valuation coefficients -----			
	Parameter	Estimate	Asymptotic Std.Error	p-value	Parameter	Estimate	Asymptotic Std.Error	p-value
CFO	$\gamma_1$	0.3763	0.0214	0.0000	$\gamma^*_1$	0.2888	0.0620	0.0000
res $\Delta$ INV	$\gamma_2$	0.3982	0.0288	0.0000	$\gamma^*_2$	0.3419	0.0833	0.0000
res $\Delta$ AR	$\gamma_3$	0.3423	0.0285	0.0000	$\gamma^*_3$	0.1349	0.0846	0.1110
otherACC	$\gamma_4$	0.3663	0.0216	0.0000	$\gamma^*_4$	0.3005	0.0626	0.0000

**Panel B:** Tests of rational pricing of earnings components.

Variable	Null Hypothesis	Likelihood Ratio Statistic. ( $\chi^2$ )	Marginal significance level
CFO	$\gamma_1 = \gamma^*_1$	7.163	0.0074
res $\Delta$ INV	$\gamma_2 = \gamma^*_2$	4.703	0.0301
res $\Delta$ AR	$\gamma_3 = \gamma^*_3$	26.009	0.0000
otherACC	$\gamma_4 = \gamma^*_4$	5.741	0.0166
All	$\gamma_q = \gamma^*_q$	48.985	0.0000

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All variables are defined in the text.

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