ABSTRACT

Through this paper I intend to bring to forefront a reexamination of the main methods and models used to determine accruals, in the accruals anomaly literature. The literature on accruals anomaly (Sloan, 1996) tests the theory that investors fixate on earnings in the process of establishing stock prices, failing to perceive the different persistence of accrual and cash flow components of earnings. Thus, accrual component of earnings is less persistent than cash flow component of earnings and higher accruals lead to abnormal low stock returns and vice versa. As this relation may indicate an improper use of accruals in forecasting future earnings, it is imposed the understanding of the significance of the accruals. The interest in accruals arise from the attempt of explaining earnings quality by using a broader definition of accruals. An important stream of research in this literature is the use of a proper measure of accruals. The central point of this research is based incisively on the Sloan (1996) definition. This assumes that accruals are changes in the current net operating assets. Further, other methods developed involve: aggregate change in current and non-current net operating assets (Richardson, et al. 2005), cumulative accruals measure (Hirshleifer, et al. 2004) and change in net operating assets (Richardson et al. 2006a). The literature models these accruals in order to determine abnormal or discretionary accruals. Abnormal accruals are most often used in literature as a proxy for earnings management. Models used to estimate normal and abnormal levels of accruals start with Jones (1991) model and continue with modified Jones model, performance matched procedure (Kothari et al. 2005), Dechow and Dichev (2002) approach and discretionary estimation errors of Francis et al. (2005). The main purpose of this survey is to discuss the variations and the consequences of these methods and models in the literature of accruals anomaly. The proper understanding of accruals anomaly, considered by LaFond (2005) a general phenomenon, could improve investors’ forecasting and lead to an increase in economic growth and development of capital markets.

Key words: accruals, accruals anomaly, working capital, capital market, financial information, investors

JEL codes: M21, M41

1. Introduction

In this paper I review the literature on accruals anomaly. Although, there are several papers which have already reviewed this topic, the purpose of this survey is to complement them. Accruals anomaly, originated with Sloan (1996) study, is defined as the relation between accruals and stock returns. The approach I adopt for this review involves a survey on the literature with focus on the main methods and models used to compute or model accruals.
The literature on accruals anomaly (Sloan, 1996) tests the theory that investors fixate on earnings in the process of establishing stock prices, failing to perceive the different persistence of accrual and cash flow components of earnings. Accrual component of earnings is less persistent than cash flow component of earnings and higher accruals lead to abnormal low stock returns and vice versa. As this relation may indicate an improper use of accruals in forecasting future earnings, is imposed the understanding of the significance of the accruals. The interest in accruals arouse from an attempt to explain earnings quality by using a broader definition of accruals.

The use of a broader definition for accruals represents an extension of Sloan (1996) study in the accruals anomaly literature. The central point of this research is based incisively on Sloan (1996) definition. This assumes that accruals are changes in current net operating assets. During the time, accruals definition had a continuing evolution. Either considered a component of earnings, either a determinant of earnings persistence, the evolution and the significance of this concept is incontestable. Starting with Sloan (1996), Healy (1985) and Jones (1991) it was defined as non-cash working capital and depreciation. But, since, the revolutionary appearance of the cash flow statement and the controverted study of Hribar and Collins (2002) which claim that the balance sheet method may diminish the results, a new era of the accruals definition started. Hence, accruals are computed as difference between earnings and cash flow. Further, based on the assumption that all balance sheet accounts are products of the accrual accounting system, Richardson et al. (2005) introduce a more complex measure of accruals based on the change in net operating assets other than cash.

Accruals determined through these methods are used then in abnormal accruals models. Models used to estimate normal and abnormal levels of accruals start with Jones (1991) model and continue with modified Jones model, performance matched procedure (Kothari et al. 2005), Dechow and Dichev (2002) approach and discretionary estimation errors of Francis et al. (2005).

The main purpose of this survey is to establish the role of accruals on the capital market and the possible effects caused by an improper understanding of the accruals information. Understanding the informational content of accruals involves knowledge about accruals methods and their modeling to generate abnormal accruals. This means choosing the proper measure and the best model to determine accruals. The second purpose of our survey is to make an analytical comparison between these measures and models to facilitate decision making.

The paper is organized as follows. Section 2 defines accruals, Section 3 provides an overview of the broader measures of accruals, Section 4 review the principal abnormal accruals models and Section 5 concludes.

2. What are accruals?

Sloan (1996) makes an interesting affirmation by arguing that when earnings are composed predominantly by accruals, some of the anticipated earnings may not be accomplished. I consider that this is the point that wakes up the interest of many users. Accruals can influence the quality of earnings (Sloan, 1996). When accrual component of earnings is higher than cash flow component of earnings, there is an overvaluation of earnings. Also,
earnings quality may be compromised. Hence, the information that investors perceive may be of lower quality (Hung, 2001).

Accruals are considered to be “the substance of accounting valuation” and the power that transforms accounting system in a source of information (Christensen and Demski, 2008). Searching for the proper definition for accrual, I found either to simply either to complicate definitions so, I formulate my own definition, more exhaustive and comprehensible.

Accruals are the product of an accrual accounting system, representing anticipated future benefits for investors and managers, recorded as net operating assets. Accruals as a component of earnings are less persistent that cash flow component of earnings, generating abnormal stock returns.

Accruals definition can also be visualized in a graphical form in Fig. 1. Here is presented in detail the process of generation of accruals. It can be observed that accruals are produced in an accrual accounting system. For its determination are used elements from the balance sheet. Other methods involve information from the income statement and the statement of cash flow. Accruals have two main components, a component related to assets and other related to liabilities. Therefore, accruals represent anticipated future benefits recorded as change in net operating assets. Also, accruals play a significant role in the generation of abnormal accruals (Xu and Lacina, 2009) and also allow for earnings management (Leippold and Lohre, 2010).

Fig. 1 The process of accruals determination

Source: projected by author
Even if both accruals and cash flows are components of earnings, Christensen and Demski (2008) make a significant distinction between them. Thus, while cash flow is the one considered a source of information, accruals are the one which carry the information over and above what cash flow has conveyed.

3. The broader definition of accruals

There are several methods used in the literature to measure accruals. These are divided about the source of information in balance sheet methods and cash flow methods. The most famous is Sloan (1996) balance sheet method defined as change in current net assets. The other methods are considered as extensions of this model. These are: change in current net assets (Sloan, 1996), aggregate change in current and non-current net operating assets (Richardson et al. 2005), cumulative accruals measure (Hirshleifer et al. 2004) and change in net operating assets (Richardson et al. 2006a). The cash flow method assumes computing accruals as the difference between earnings and cash flow. Table 1 provides a brief summarize of these methods. Further is provided a full description of these models and a comparative analysis between them.

<table>
<thead>
<tr>
<th>Author/Model</th>
<th>Method</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sloan (1996)</td>
<td>Change in current net operating assets</td>
<td>Non-cash working capital minus depreciation</td>
</tr>
<tr>
<td>Richardson et al. (2005)</td>
<td>Aggregate change in current and non-current net operating assets</td>
<td>Consists from 3 parts: current net operating assets, non-current net operating assets and net financial assets</td>
</tr>
<tr>
<td>Hirshleifer et al. (2004)</td>
<td>Cumulative accruals measure – net operating asset level (NOA)</td>
<td>Net operating accruals are defined as the sum between cumulative operating accruals and cumulative investments</td>
</tr>
<tr>
<td>Richardson et al. (2006a)</td>
<td>Change in net operating assets</td>
<td>Include current and non-current accruals but eliminate financing accruals</td>
</tr>
</tbody>
</table>

Source: adapted by author

3.1. Sloan (1996) method – Current net operating assets

Accruals are defined by Sloan (1996) as anticipated future benefits recorded as an increase in non-cash assets in a period. The model proposed by Sloan (1996) to determine accruals involve the balance sheet method and is based on changes in current assets and current liabilities. Thus, accruals represent the change in current net operating assets. In other words, accruals are changes in non-cash working capital minus depreciation.

\[
\text{Accruals} = (\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD - \Delta TP) - \text{Dep}
\]

Where:

\( \Delta CA \) = change in current assets
In table 2 are synthesized the steps that should be followed in order to determine accruals. The first steps include the computation of current assets and current liabilities. From these components are excluded cash, short-term debt and taxes payable. Cash is eliminated as accruals measure anticipated future benefits and cash represent real benefits. Debt included in current liabilities is excluded because is related to financial transactions and not to operating transactions. Taxes payable are excluded due to consistency with the definition of earnings.

<table>
<thead>
<tr>
<th>Phases</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Current operating assets</td>
<td>$Cash &amp; Short-term investment + Accounts receivable + Inventories +Other current assets</td>
</tr>
<tr>
<td>2. Current operating liabilities</td>
<td>$ST debt + Accounts payable + Taxes payable + Other current liabilities</td>
</tr>
<tr>
<td>3. Current net operating assets</td>
<td>Current operating assets – Current operating liabilities</td>
</tr>
</tbody>
</table>

Source: adapted by author from Sloan (1996)

All variables are scaled by total assets as a measure of firm size, to make easier the comparisons between the magnitude of earnings performance and relative magnitude of accrual and cash flow component of earnings. Total assets are an appropriate book measure of the investment base used to generate earnings and measured as the average of the beginning and end of year book value of total assets.

3.2. Richardson, Sloan, Soliman and Tuna (2005) method – aggregate change in current and non-current net operating assets

Richardson, Sloan, Soliman and Tuna (2005) develop the definition of accruals by adding to the change in current net operating assets (used by Sloan, 1996), the changes in non-current net operating assets and the changes in net financial assets. They consider that this formula is a more comprehensive measure of accruals. The efficiency of this model seems to be confirmed by the empirical results, providing stronger results than the Sloan model. This
may happen because the model contains estimates of long-term future benefits. The authors also consider that ignoring non-current accruals may determine noisy measures of accruals and cash flows.

This model consists from 3 parts: current net operating assets, non-current net operating assets and net financial assets. Zach (2006) defines these three elements as: working capital accruals, investing accruals and financing accruals. The model proposed by author to compute accruals is:

\[ \text{Accruals} = \Delta \text{Non-cash working capital} + \Delta \text{Non-current net operating assets} + \Delta \text{Net financial assets} \]

In table 3 are presented in detail the steps needed to follow in order to compute accruals.

<table>
<thead>
<tr>
<th>Phases</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Non-cash working capital (WC)</strong></td>
<td>Current operating assets (COA) – Current operating liabilities (COL)</td>
</tr>
<tr>
<td>a. <strong>Current operating assets</strong></td>
<td>Current assets (CA) – Cash &amp; Short-term investment</td>
</tr>
<tr>
<td>b. <strong>Current liabilities</strong></td>
<td>Current liabilities (CL) – Debt in current liabilities (DCL)</td>
</tr>
<tr>
<td>2. <strong>Non-current net operating assets (NCO)</strong></td>
<td>Non-current operating assets - Non-current operating liabilities (NCOA) – (NCOL)</td>
</tr>
<tr>
<td>a. <strong>Non-current operating assets</strong></td>
<td>Total assets – Current assets – Investment and Advances</td>
</tr>
<tr>
<td>b. <strong>Non-current operating liabilities</strong></td>
<td>Total liabilities – Current liabilities (CL) – Long-term debt</td>
</tr>
<tr>
<td>3. <strong>Net financial assets (Fin)</strong></td>
<td>Financial assets (short and long term investment)(FinA) – Financial assets (FinL)</td>
</tr>
<tr>
<td>a. <strong>Financial assets</strong></td>
<td>Short-term investment + Long-term investment</td>
</tr>
<tr>
<td>b. <strong>Financial assets</strong></td>
<td>Long-term debt + Debt in current liabilities + Preferred stock</td>
</tr>
<tr>
<td>4. <strong>Net operating assets</strong></td>
<td>Non-cash working capital (WC) + Non-current net operating assets (NCO)</td>
</tr>
<tr>
<td>5. <strong>Accruals</strong></td>
<td>( \Delta \text{WC} + \Delta \text{NCO} + \Delta \text{Fin} )</td>
</tr>
</tbody>
</table>

Source: adapted by author from Richardson et al. (2005)

This measure is different by Sloan (1996) measure by incorporating non-current operating and financial assets and liabilities. Also, Sloan (1996) excludes taxes payable and treats depreciation expense as a current accrual.

Hirshleifer et al. (2004) consider net operating assets as a better predictor for future returns and a better proxy for investors’ misperceptions. Net operating accruals (NOA) are defined as the sum between cumulative operating accruals and cumulative investment.

\[ NOA_T = \sum_{t=0}^{T} \text{Accruals}_t + \sum_{t=0}^{T} \text{Investment}_t \]

The method proposed by the authors involves the use of aggregate accruals as a stimulant for earnings quality. Although, Sloan (1996) results support just the use of previous year, the lower persistence of accruals appears to largely manifest over the next 1 to 3 years. Hirshleifer et al. (2004) try to demonstrate that the level of net operating assets scaled by previous year’s total assets is also in a negative relation with future returns. The level variable is considered by authors as superior to the change variable because it captures cumulative past changes not just the most recent annual changes. All regressions use the level of net operating assets (NOA) deflated by lagged total assets (Total assets_{t-1}), as the measure of the level of NOA. Also, firms are ranked in portfolios after the NOA level. Authors use the accruals measure of Sloan (1996) only to compute cash flow. NOA measure is:

\[ NOA_t = \frac{NOA_t}{\text{Total assets}_{t-1}} \]

<table>
<thead>
<tr>
<th>Phases</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Operating assets</td>
<td>Total assets – Cash &amp; Short- term investment</td>
</tr>
<tr>
<td>2. Operating liabilities</td>
<td>Total liabilities – Short term debt – Long term debt – Minority interest – Preferred stock – Common equity</td>
</tr>
<tr>
<td>3. Net operating assets</td>
<td>Operating assets – Operating liabilities</td>
</tr>
</tbody>
</table>

Table 4. Phases in NOA computation (Hirshleifer et al. 2004)

Source: adapted by author from Hirshleifer et al. (2004)

Nevertheless, Richardson et al. (2006b) remark that Hirshleifer et al. (2004) actually divide aggregate accruals in the current year by aggregate accruals in the previous year which is the same with the measure of accruals for one year. Thus, when “a level is deflated by a lagged level is equivalent with a change”. Richardson et al. (2006b) consider that Hirshleifer et al. (2004) measure doesn’t capture the cumulative past difference between earnings and cash flow because it eliminates past changes in assets components of NOA. Also, the focus on NOA may indicate a focus on earnings and ignore accruals and cash flow. Richardson et al.
(2010) state that this measure is an algebraic transformation of $\Delta NOA$ measure from Richardson et al. (2005) combined with operating liability and financial assets.

### 3.4. Richardson, Sloan, Soliman and Tuna (2006a) – net operating assets

Richardson et al. (2006a) follow a model where accruals are measured as change in net operating assets deflated by net operating assets from the previous year. Net operating assets are the difference between operating assets and operating liabilities. Total operating accruals are the sum of the working capital and non-current operating accruals. Fairfield et al. (2003) consider non-current operating accruals as a form of growth and only working capital are considered accruals. Richardson et al. (2006a) definition follows Richardson et al. (2005) by incorporating non-current operating accruals but exclude financing accruals. Sloan (1996) doesn’t include non-current operating assets and liabilities in his definition. Similar with Richardson et al. (2005) are not eliminated taxes payable and depreciation from the net current assets measure. This method of accruals should provide an increase in earnings quality.

$$\text{Net operating assets} = (\Delta \text{Current Assets} - \Delta \text{Cash & Short-term investments} + \Delta \text{Non-current operating assets}) - (\Delta \text{Total liabilities} - \Delta \text{Debt in current liabilities} - \Delta \text{Long-term debt})$$

The formula used for accruals become:

$$\text{Accruals}_t = \frac{\Delta NOA_t}{NOA_{t-1}}$$

<table>
<thead>
<tr>
<th>Phases</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Operating assets</strong></td>
<td>Current operating assets + Non-current operating assets</td>
</tr>
<tr>
<td><strong>a. Current operating assets</strong></td>
<td>Current assets (CA)- Cash &amp; Short-term investments</td>
</tr>
<tr>
<td><strong>b. Non-current operating assets</strong></td>
<td>Total assets – Current assets (CA)— Investment and advances</td>
</tr>
<tr>
<td><strong>2. Operating liabilities</strong></td>
<td>Current operating liabilities + Non-current liabilities</td>
</tr>
<tr>
<td><strong>a. Current operating liabilities (COL)</strong></td>
<td>Current liabilities - Debt in current liabilities</td>
</tr>
<tr>
<td><strong>b. Non-current liabilities (NCOL)</strong></td>
<td>Total liabilities – Current liabilities – Long-term debt</td>
</tr>
<tr>
<td><strong>3. Net operating assets</strong></td>
<td>Operating assets - Operating liabilities</td>
</tr>
</tbody>
</table>

Source: adapted by author from Richardson et al. (2006a)
3.5. Cash flow statement method

A very common accruals measure in the literature is based on the cash flow statement. The cash flow method has gained more interest since the controversial work of Hribar and Collins (2002). They demonstrate that the balance sheet method may affect earnings managements’ tests by causing misperceptions. Cash flow method is more often used in the literature (Leippold and Lohre, 2010) as a sensitivity test for the balance sheet method. Kothari et al. (2006) use both cash flow and balance sheet methods in order to account for measurement errors. However, results are similar. Hafzalla (2010) supports that cash flow method “excludes the effect of acquisitions and foreign currency translation adjustments”.

Hribar and Collins (2002) propose two alternative methods to the balance sheet method. The first, also called the traditional method, is determined as the difference between earnings and cash flow from operations scaled by total assets.

\[ \text{Accruals} = \text{Earnings} - \text{Cash flow} \]

Earnings represent net income before extraordinary items and operating cash flow is cash from operating activities. All variables are deflated by total assets (average total assets, lagged total assets, beginning total assets). This method is used by Kraft et al. (2006), Hafzalla (2010), Collins and Hribar (2000), Xie (2001) and Pincus et al. (2007).

The second method proposed by Hribar and Collins (2002) include changes in non-cash working capital account plus depreciation. This method is more comparable with the balance sheet method.

\[ \text{Accruals} = - (\Delta \text{Accounts Receivable} + \Delta \text{Inventory} + \Delta \text{Accounts Payable} + \Delta \text{Tax payable} + \Delta \text{Other assets} + \text{Depreciation}) \]

These elements are taken from the cash flow statement and “are not affected by non-operating changes in these accounts” (Hribar and Collins, 2002).

3.6. Comparative analysis between the accruals methods

After the detailed presentation of accruals methods I consider necessary a comparative analysis between these models (table 6). I analyze the methods based on the balance sheet data as they are more comparable and the differences and similitudes are highlighted easier. The analysis is structured firstly after the measures applied and the components included. Next, are presented some advantages and disadvantages for these methods.
All the accruals methods are based on a difference between assets and liabilities. While Sloan (1996) considers accruals as current net operating assets, Richardson et al. (2005) include in their model non-current net operating assets and financial net assets. Richardson et al. (2006a) use only current and non-current net operating assets, eliminating financing elements. And, Hirshleifer et al. (2004) consider a cumulative measure for accruals as net operating assets. Nevertheless, Hirshleifer et al. (2004) model is just a transformation of Richardson et al. (2005) model with elements of operating liability and financing assets. Also, this is the only model that uses the level of the variables and not the change of the variables as others do. However, Richardson et al. (2006b) demonstrate that, a level variable deflated by a lagged variable is a change variable. Sloan (1996) and Richardson et al. (2005) deflate accruals by average total assets while, Hirshleifer et al. (2004) use lagged total assets and Richardson et al. (2006a) use lagged operating assets (table 6). Sloan (1995) model estimates short-term benefits due to the nature of net current assets. All other models estimate long-term benefits because are included non-current net assets. This aspect of short and long term estimation is intriguing because current assets tend to reverse quickly while non-current assets will reverse in a longer period. According to investors’ expectations, some of them may be interested in anticipated benefits that will reverse quickly and not in anticipated benefits that will take longer to reverse and may depreciate in this time. Thus, one model for determining accruals may not be so conclusive for some investors that it can be for others. This depends also on the type of investors and on what period they want to invest.

Although Sloan (1996) is the most used model, it is also very controverted because it doesn’t include non-current assets. Richardson et al. (2005) model cast doubt from my point of view because it includes financing elements and these are not proper anticipations of future benefits. Also, Hirshleifer et al. (2004) model seems to be a wrong decision as it includes the level variables and according to Richardson et al. (2006b) the focus on NOA may indicate a focus on earnings and ignore accruals and cash flows. Finally, Richardson et al. (2006a) model captures both current and non-current net operating assets, deflated by lagged operating assets. This model is appropriate for long-term investors while Sloan (1996) model is proper for short-term investors.

Balance sheet methods for computing accruals are the most common in the literature. The use of the cash flow method has become more popular since the work of Hribar and Collins (2002). They provide evidence that the balance sheet method can affect earnings management tests. This method is most frequently used as a sensitivity test or when are not enough data to compute accruals. Sensitivity tests are robust regarding both the balance sheet method and the cash flow method.
Table 6. Comparative analysis between the balance sheet methods

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>Current net operating assets</td>
<td>Current and non-current net operating assets (include financing elements)</td>
<td>Net operating assets (operating assets – operating liabilities)</td>
<td>Current and non-current net operating assets</td>
</tr>
<tr>
<td>Differences</td>
<td>Doesn’t include non-current operating assets</td>
<td>Include current net operating assets, non-current net operating assets and net financial assets. Assets and liabilities are classified as operating and financing.</td>
<td>Is a transformation of Richardson et al. (2005) measure with elements of operating liability and financing assets. Include both current and non-current accruals. Net operating assets include current and non-current operating assets, either are not computed separated.</td>
<td>The sum of working capital and non-current operating assets. Doesn’t include financing accruals. Follows Richardson et al. (2005).</td>
</tr>
<tr>
<td>Variable use</td>
<td>Change</td>
<td>Change</td>
<td>Level</td>
<td>Change</td>
</tr>
<tr>
<td>Deflation</td>
<td>Average total assets</td>
<td>Average total assets</td>
<td>Lagged total assets</td>
<td>Lagged operating assets</td>
</tr>
<tr>
<td>Estimation of future benefits</td>
<td>Short term benefits</td>
<td>Long term benefits</td>
<td>Long term benefits</td>
<td>Long term benefits</td>
</tr>
<tr>
<td>Reversals</td>
<td>Quickly</td>
<td>Longer</td>
<td>Longer</td>
<td>Longer</td>
</tr>
<tr>
<td>Issues</td>
<td>Could be a noisy measure of accruals and cash flow</td>
<td>Include financing elements</td>
<td>A level deflated by a lagged variable is change. Focus just on NOA, ignore accruals and cash flow</td>
<td>Deflated by lagged operating assets</td>
</tr>
</tbody>
</table>

Source: projected by author

4. Abnormal accruals models

The purpose of accruals models is to capture a positive correlation between the measures of abnormal accruals and accruals level. This is equivalent with extreme accruals having extreme abnormal accruals (Dechow et al. 2010).

The accruals models are based on the assumption that abnormal accruals will reduce the benefits of decisions (Dechow et al. 2010). These models generate normal and abnormal accruals. Abnormal accruals, also named discretionary accruals are detected from the modeling of normal accruals. Normal or nondiscretionary accruals are connected with the fundamental performance of firms and represent the expected accruals, given firms’ operations and conditions. When normal accruals are modeled correctly then, abnormal accruals will represent distortions of lower quality (Dechow et al. 2010). Results from the previous studies (Chan et al. 2006; Xie, 2001) confirm that nondiscretionary accruals don’t predict future returns and that discretionary accruals contribute to the predictability of returns.

If abnormal accruals have a lower coefficient, this suggests that abnormal accruals are less relevant than other components of earnings but are not insignificant in the process of forecasting future earnings (Dechow et al. 2010). Dechow et al. (1995) make some useful observations related to the specification and the power of the abnormal accruals models. Thus, they remark that all the models generate: well-specified test statistics if are applied to random samples and tests of low power for earnings management. Also, all models are misspecified if are tested to samples with extreme financial performance.

Abnormal accruals models can be estimated either at firm specific (time-series) regressions or industry (cross-sectional) regressions. The firm level estimation imposes sample
survivorship biases while the industry classification may produce larger residuals (Dechow et al. 2010) and has less restrictive data requirements (Cheng et al. 2012).

These models usually mitigate errors of Type I and Type II. Type I errors is classification of accruals as abnormal when they are a representation of fundamental performance. Type II errors is classification of accruals as normal when they are abnormal.

There are some authors (Dechow et al. 2010) that cast doubts regarding the significance of abnormal accruals: whether they are a reflection of distortions or they are a wrong specification of accruals models. Meanwhile, others (Dechow et al. 2012) question the integrity of the accruals models. There are some opinions (Young, 1999; Meuwissen et al. 2007) that consider that accruals models can have misspecification problems, especially in an international context or that have a low predictive accuracy (Meuwissen et al. 2007). However, Dechow et al. (2012) note that certain concerns regarding the impossibility of these models to capture nondiscretionary accruals, has led to supplementation with performance-matching procedures.

In previous studies, discretionary accruals are used as a proxy for opportunistic earnings management. If exists earnings management, discretionary accruals should contribute to accruals effect more than nondiscretionary accruals (Chan et al. 2004). The best model to separate accruals components and detect earnings management is the one that can identify stronger discretionary accruals and weaker nondiscretionary accruals effects than other models, according to Chan et al. (2004).

The most important abnormal accruals models are summarized in table 7.

<table>
<thead>
<tr>
<th>Accrual model</th>
<th>Theory</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jones (1991) model</td>
<td>Accruals are a function of revenue growth and depreciation is a function of PPE. All variables are scaled by total assets.</td>
<td>Correlation or error with firm performance can bias tests. R² is around 12%. Residual is correlated with accruals, earnings and cash flow.</td>
</tr>
<tr>
<td>Modified Jones model (Dechow et al., 1995)</td>
<td>Adjusts Jones model to exclude growth in credit sales in years identified as manipulation years.</td>
<td>Provides some improvement in power in certain settings (when revenue is manipulated).</td>
</tr>
<tr>
<td>Performance-matched model (Kothari et al., 2005)</td>
<td>Matches firm-year observation with another from the same industry and year with the closest ROA. Discretionary accruals are from the Jones model (or Modified Jones model).</td>
<td>Can reduce power of test. Apply only when performance is an issue.</td>
</tr>
<tr>
<td>Dechow and Dichev approach (2002)</td>
<td>Accruals are modeled as a function of past, present, and future cash flows given their purpose to alter the timing of cash flow recognition in earnings.</td>
<td>$\sigma(\varepsilon_{t})$ or absolute $\varepsilon_{t}$ proxies for accrual quality as an unsigned measure of extent of accrual “errors.” Focuses on short-term accruals does not address errors in long-term accruals.</td>
</tr>
<tr>
<td>Discretionary estimation errors (Francis et al., 2005)</td>
<td>Decomposes the standard deviation of the residual from the accruals model into an innate component that reflects the firm’s operating environment and a discretionary component that reflects managerial choice.</td>
<td>$\sigma(\varepsilon_{t})$ or absolute $\varepsilon_{t}$ proxies.</td>
</tr>
</tbody>
</table>

Source: Dechow et al. (2010)
4.1. *Jones (1991) model*

Jones (1991) model represents a function of change in sales and the level of gross property, plant and equipment (hereafter PPE). The change in sales is a control for the firm growth as working capital is related to sales. And PPE control for depreciation expenses contained in accruals (Chan et al. 2004). All variables are deflated by lagged total assets.

It estimates both normal and abnormal accruals. Normal accruals are the predicted values and abnormal accruals are the residuals. This is equivalent with normal accruals representing expected accruals given firm’s growth and abnormal accruals representing unexpected accruals (Chan et al. 2004).

\[
\text{Acc}_t = \alpha + \beta_1 \Delta \text{REV}_t + \beta_2 \text{PPE}_t + \varepsilon_t
\]

- Acc - accruals
- \( \Delta \text{REV} \) - change in sales revenue
- PPE - gross property, plant and equipment
- \( \alpha, \beta_1, \beta_2 \) - estimates of the model coefficients in year t

Jones model provides evidence about the correlations of accruals with sales and PPE. However, these correlations have a low explanatory power. They are able to explain just 10% from accruals variation. The explanation for the low explanatory power may rely in the excessive discretion of managers over the accrual process (Dechow et al. 2010). Nevertheless, this model presents some higher positively correlations of residuals and total accruals. Also, residuals are positively correlated with earnings performance and negatively correlated with cash flow performance (Dechow et al. 1995). According to Dechow et al. (2010) this may be a sign of a high Type I error rate. Further, Dechow et al. (2011) highlight the possibility of Type II errors when residuals are used as a proxy for the lower quality of accruals regarding earnings management. They support that discretionary accruals are less powerful than total accruals in detecting earnings management in SEC enforcement releases. In addition, Xie (2001) documents that residuals have lower predictive ability for one year-ahead earnings than nondiscretionary accruals.

The abnormal accruals from this model are often used as a proxy for managerial discretion. But, Healy (1996) and Bernard and Skinner (1996) consider that these abnormal accruals also capture unusual nondiscretionary accruals and unintentional misstatements.

Even if the most popular abnormal accrual model, the literature rises some concerns regarding its accuracy. For example, Dechow et al. (1995) and Guay et al. (1996) consider that discretionary accruals are imprecise as estimated coefficients have a large variation. Nevertheless, Jones model displays the higher explanatory power related to other models used in detecting earnings management (Chan et al. 2004). Moreover, Healy (1996) and Bernard and Skinner (1996) highlight that discretionary and nondiscretionary accruals are not proper separated due to the omitted variable problem.
4.2. Dechow et al. (1995) - Modified Jones Model

The modified Jones model is proposed by Dechow et al. (1995). This model attempts to reduce Type II error of the original model by adjusting for growth in credit sales. The purpose of this model is to increase the power of the test even it can be met Type I errors (Dechow et al. 2010). The model assumes that changes in credit sales are related to earnings management. The modified Jones model has greater power than the Jones model in detecting earnings management according to Dechow et al. (1995).

\[ \text{Acc}_t = \alpha + \beta_1(\Delta \text{REV}_t - \Delta \text{Rec}_t) + \beta_2 \text{PPE}_t + \varepsilon_t \]

Acc – total accruals
\( \Delta \text{REV} \) – change in sales revenue
\( \Delta \text{Rec} \) - change in accounts receivables
PPE – gross value of property, plant and equipment

Kraft et al. (2006) consider that this test can be considered as a special case of Sloan (1996) earnings’ fixation explanation where investors are not aware of the nature of discretionary accruals. Xie (2001) tests if Sloan mispricing is attributable to abnormal or normal accruals. Results confirm that investors misprice discretionary accruals and this may cause abnormal returns in year t+1. Abnormal accruals are the residuals from the models and normal accruals are the difference between total and abnormal accruals. Modified Jones model has been also exposed to few changes by several researchers.

4.3. Dechow and Dichev (2002)

This model implies an estimation of past, current and future cash flow, as additional relevant variables in explaining nondiscretionary accruals. This is argued by the relation between accruals and cash flow. “Accruals anticipate future cash flow and reverse when accruals are received or paid” (Dechow et al. 2010). This model use only short-term working capital accruals. Nevertheless the power of this test is higher than of the modified Jones model. The standard deviation of the residuals is used as proxy for earnings quality in Dechow et al. (2010). According to Dechow et al. (2010) the power of the test will reduce, because this model is unsigned “when the researcher predicts accounting distortions in a particular direction”. All variables are scaled by average total assets. Dechow and Dichev (2002) is based on the residuals from the industry-level regressions (Dechow et al. 2011).

\[ \Delta \text{WC} = \alpha + \beta_1 \text{CFO}_{t-1} + \beta_2 \text{CFO}_t + \beta_3 \text{CFO}_{t+1} + \varepsilon_t \]

WC - non-cash working capital
CFO- operating cash flow
4.4. Kothari et al. (2005) – Performance-matched procedure

Kothari et al. (2005) propose a new model called “performance-matched procedure” where subtract discretionary accruals estimates from the Jones model by using control firms matched by industry and ROA. This model is an attempt to mitigate the doubts between performance and the residuals from the previous models (Dechow et al. 2010).

\[
\text{DisAcc}_t - \text{Matched firm's DisAcc}_t
\]

Kothari et al. (2005) model supposes the identification of a firm from the same industry with the closest level of ROA with the sample firm (Dechow et al. 2010). There are two ways to control for performance. First, is the introduction of ROA variables as an additional independent variable. Second, is the matching of the firm-year observation of the treatment firm with the observation of the control firm from the same industry with the closest ROA (Jones et al. 2008). Then it deducts residual from those of the sample to generate “performance-matched” residuals (Dechow et al. 2010). The model uses discretionary accruals from the Jones and modified Jones modes. Then, apply a test statistic that is determined as “the equal-weighted sample mean discretionary accrual divided by an estimate of its standard error.” The test statistic is:

\[
\frac{DA}{s(DA)/\sqrt{N}} \sim t_{N-1}
\]

DA - discretionary accrual

\[\overline{DA}\] - mean of discretionary accrual

$s(DA)$ – estimated standard deviation of \[\overline{DA}\]

N- sample size

Dechow et al. (2012) observe two limitations for this method. These are: the misspecification is mitigated only if the researcher matches on the relevant correlated omitted variable and the test power is reduced if standard error of the test statistic is increased.

4.5. Discretionary estimation errors - Francis et al. (FLOS) (2005)– an extension of Dechow and Dichev model.

Francis et al. (2005) model is an extension of Dechow and Dichev (2002) by adding growth in revenue and gross property, plant and equipment. This model is a function of firm characteristics identified in Dechow and Dichev (2002). Residual’s standard deviation is decomposed in innate estimation errors and discretionary estimation errors. If standard deviation is higher, then accruals quality is lower and vice versa. Estimation of the model is accomplished at industry-year.

\[
\text{Acc}_t = \alpha + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \beta_4 \Delta Rev_t + \beta_5 PPE_t + \epsilon_t
\]
4.6. Comparative analyses between abnormal accruals models

The analysis of abnormal accruals models is presented in table 8. This analysis highlights the strengths and the limits, the determinants used, the measures for abnormal accruals and the deflation variable.

The most common and used models for abnormal accruals are Jones (1991) and modified Jones models. These models are modeling accruals to determine abnormal accruals. Dechow and Dichev (2002) and Francis et al. (2005) models are functions of past, present and future cash flow. And Kothari et al. (2005) is a performance matched procedure based on the residuals from the Jones (1991) and modified Jones models. As these models are predisposed of Type I error and Type II error, the modifications applied have the purpose to mitigate these errors. Every model desires to eliminate the doubts related to its accuracy. The current evidence suggests that Jones model has the higher explanatory power, although this power is actually lower. In general, abnormal accruals are represented by the residuals from these models. Variables are deflated by lagged total assets (Jones and modified Jones models) or average total assets (Dechow and Dichev, 2002 and Francis et al. 2005). The most used determinants for non-discretionary accruals are change in sales and gross property, plant and equipment.

Many papers (Guay et al. 1995; Cheng and Thomas, 2006; Beneish and Nichols, 2006) use multiple abnormal accruals models to check which of them have the greater explanatory power. Guay et al. (1995) use five discretionary models to test the relation between earnings components. Results confirm the capacity of the discretionary accruals model to “isolate discretionary accruals”. Hence, Jones and modified Jones models generate discretionary accruals consistent with performance and opportunistic smoothing of earnings. The main conclusion that can be dropt is that Jones and modified Jones models have the ability to identify discretionary accruals. Cheng and Thomas (2006) test whether accruals anomaly is a part of the overall value-glamour anomaly, using the modified Jones model and rank models. Overall, these studies support that the best model is Jones model. But, Dechow et al. (2011) make a contrary observation that the modified Jones model and the performance-matched Jones model are not as strong as the Dechow and Dichev model.
Table 8. Comparative analyses between abnormal accruals models

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<tbody>
<tr>
<td><strong>Function</strong></td>
<td>Change in sales and gross property, plant and equipment</td>
<td>Adjust for growth in credit sales</td>
<td>Past, current and future cash flows</td>
<td>Subtracts discretionary accruals from Jones model, using control firms matched by industry and ROA</td>
<td>Is an extension of DD, adding growth in revenue and gross property, plant and equipment</td>
</tr>
<tr>
<td><strong>Limits</strong></td>
<td>Low explanatory power Possible Type I and II error</td>
<td>Still can be met Type I error</td>
<td>Reduced power because the model is unsigned. Doesn’t address errors in long term accruals</td>
<td>The test power is reduced if standard error of the test statistic is increased.</td>
<td>Doesn’t investigate if these adjustments eliminate Type I error and Type II error</td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td>Explanatory power is higher than other models</td>
<td>Reduce Type II error</td>
<td>Higher power than Jones model</td>
<td>Mitigate the doubts between the performance and residuals</td>
<td>Control variables should increase the power of the test</td>
</tr>
<tr>
<td><strong>Abnormal accruals</strong></td>
<td>Residuals</td>
<td>Residuals</td>
<td>Residuals reflect accruals not related to cash flow</td>
<td>Residuals from the Jones and modified Jones model</td>
<td>Residuals are decomposed in innate estimation error and discretionary estimation error</td>
</tr>
<tr>
<td><strong>Determinants of non-discretionary accruals</strong></td>
<td>Change in revenue ((\Delta \text{REV}_{t,t}))</td>
<td>Change revenue - Change in account receivables ((\Delta \text{REV}<em>{t,t} - \Delta \text{REV}</em>{t,t-1}))</td>
<td>Past, present and future cash flows ((\text{CF}<em>{t-1,t}, \text{CF}</em>{t,t}, \text{CF}_{t,t+1}))</td>
<td>-</td>
<td>Past, present and future cash flows ((\text{CF}<em>{t-1,t}, \text{CF}</em>{t,t}, \text{CF}_{t,t+1}))</td>
</tr>
<tr>
<td></td>
<td>Gross property, plant and equipment ((\text{PPE}_{t,t}))</td>
<td>Gross property, plant and equipment ((\text{PPE}_{t,t}))</td>
<td>-</td>
<td>Change in revenue ((\Delta \text{REV}_{t,t}))</td>
<td>Gross property, plant and equipment ((\text{PPE}_{t,t}))</td>
</tr>
<tr>
<td><strong>Deflation</strong></td>
<td>Lagged total assets</td>
<td>Lagged total assets</td>
<td>Average total assets</td>
<td>-</td>
<td>Average total assets</td>
</tr>
</tbody>
</table>

Source: projected by author
5. Conclusions

In this survey I highlight the main advances in accruals anomaly. A key point is that the proper understanding of the accruals persistence could enhance earnings quality. Higher accruals could be a sign of alarm that earnings could be overestimated. This means that accruals may not reverse and is less probable that it would be converted into cash.

Considered by LaFond (2005) a general phenomenon, the proper understanding of accruals anomaly, could improve investors forecasting and lead to an increase in economic growth and development of capital markets. As a policy implication I recommend taking into account accruals persistence, as this impacts significantly earnings quality. This also involves attention to accounting methods used to record current net assets. The proper measure for accruals depends on the strategies assumed. The most used is Sloan (1996) method although it only anticipates short term benefits. For a measure that anticipates long term benefits the proper would be Richardson et al. (2006a). Regarding abnormal accruals models, these are very converted as neither one offers in reality a high explanatory power, although Jones model records the robust results.

References


their determinants and their consequences. Journal of Accounting and Economics, 50 (2-3),
344–401.

Contemporary Accounting Research, 28(1), 17–82.

Journal of Accounting Research, 50 (2), 275-334.


of Accounting and Economics, 39, 295–327


research. Journal of Accounting Research, 40(1), 105-134.


Research, 29, 193–228

Jones, K., Krishnan, G., & Melendrez, K. (2008). Do models of discretionary accruals detect actual
cases of fraudulent and restated earnings? An empirical analysis. Contemporary Accounting
Research, 25(2), 499–531.


