THE ACCOUNTING MECHANISMS BEHIND INCOME SMOOTHING

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ABSTRACT

This paper proposes an approach for improving the estimation of artificial smoothing, identifies important biases that affect previous research and proposes a more critical use of traditional models.

The developed approach differs from the methods of previous studies because it first involves a more precise application of the concept of artificial smoothing. Second, the weight of individual artificial smoothing levers is identified. Third, we verify the existence of a smoothing effect derived from the matching principle.

Our study of a sample of 4,426 Italian companies and 22,695 firm-year observations confirms the overall smoothing effect of adjusting entries. However, our analysis of individual levers shows that only the weight of the change in inventories is very strong. The paper demonstrates that this strong effect can also be determined only by the matching mechanism without any relation to managerial discretionary assessments.

This finding suggests the need for a more critical use of models that measure artificial smoothing and the need to exclude these objective variations when analyzing the earning management estimate.

Keywords: Income Smoothing, Earning Management, Accruals, Adjusting Entries.

JEL: M40, M 41, G14.

INTRODUCTION

Income smoothing is one aspect of earnings management that has consistently received much attention (Buckmaster, 1992), although the analysis of the mechanisms through which it acts has never been sufficiently thorough.

In the context of earnings management, the income smoothing hypothesis predicts that managers level profits, driven by their desire to reduce reported income fluctuations around some predetermined target. Since it is known that accruals have a dampening effect on changes in cash flows, most previous studies have begun by estimating accruals but then shift the focus to the reasons for smoothing and its effect (Hepworth, 1953). These studies have provided no details on what dynamics follow individual types of accrual to ensure this smoothing effect. Even research on discretionary accruals from Healy (1985) traditionally identified them as a deviation from historical trends without delving into the individual accounting mechanisms used.

Therefore, the objective of this paper is not to further discuss the reasons for and effects of smoothing but to directly investigate the role of estimated accruals in the accounting mechanism of income smoothing. Hence, we focus on so-called artificial smoothing, as opposed to real smoothing (Albrecht & Richardson, 1990).

Artificial smoothing is also known as accounting smoothing because it is achieved through accounting choices and differs from real smoothing, which is also called transactional

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smoothing, as it occurs through real transactions with counterparties external to the company. From this distinction, it follows that artificial smoothing cannot be implemented by managing changes in payment times (real smoothing).

Thus, in contrast to previous studies (e.g., Jones, 1991; Dechow, 1994; Hribar & Collins, 2002, Kim & Qi, 2010, Garg, 2018), we propose a methodology that excludes changes in operating receivables and liabilities from artificial smoothing levers (Cecchi, 2018).

In other words, the analysis of artificial smoothing should not contrast cash flow from operations with total accruals but rather should contrast unadjusted income with estimated accruals.

According to this more precise distinction, the investigation process takes place through a progressive focus, and the first research question is to what extent single estimated accruals affect unadjusted income and lead to net reported income.

After identifying the sample by selecting 4,426 Italian companies (22,695 firm-year observations), we first estimate the weight of the accruals previously defined in determining the net income. In doing so, we observe that the average value of estimated income accruals (i.e., excluding changes in operating receivables and liabilities) is very important and is largely negative.

In percentage terms, estimated accruals reduce the unadjusted income by 60%, bringing the average profit to 40%. In analyzing individual accruals, on average, the most important negative value of the samples is given by depreciation and amortization (61.6%), and the greatest positive value is given by change in inventories (10.2%). Predictably, the differences between the sectors of activity are marked.

The next step is to investigate the dynamics of smoothing. Then, the second research question is how the individual accrual components change when unadjusted income changes.

Therefore, we first determined for each company the changes in individual accruals and unadjusted income compared to the previous year's values. This methodology allowed us to conduct a more precise analysis of accounting policies than the analysis of overall accruals carried out by previous studies (DeAngelo, 1986; Jones 1991, etc.).

Data analysis confirms the smoothing effect of total accruals on unadjusted income to obtain net income but also highlights that not every accrual has the same impact. While the effect of changes in inventory is very strong, if they even exist, the effects of other changes seem modest.

This strong correlation led us to ask the third research question, i.e., whether this inventory smoothing effect was derived more from the matching principle than from the discretionary evaluation of managers.

We therefore formalized the problem by verifying that the accounting of the inventory changes required by the matching principle in most cases leads to an "*objective*" smoothing effect that does not depend on the assessments. It is merely an accounting mechanism, and in contrast to previous research, this effect should be eliminated when we analyze the discretionary choices of managers to regularize income flows.

Our study contributes to the ever-growing literature on income smoothing in several ways.

First, by proposing a more accurate association between changes in the balance sheet values and the concept of artificial smoothing, we improve the estimate. Second, by suggesting an approach that deepens the role of individual accruals in accounting smoothing mechanisms, we present evidence that a significant part of leveling, detected overall by previous research, is

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ensured by changes in inventories. Third, we demonstrate that at least a part of this inventory smoothing effect is a direct consequence of the matching principle and should be further analyzed and isolated in future research on accounting manipulations.

The remainder of the paper is organized as follows. In the next section, we provide an overview of the literature review, and we set out our research questions. Section 3 describes the methodology and the sample formation process. Section 4 reports and discusses the results. Section 5 concludes.

LITERATURE REVIEW

The first studies on income smoothing generally referred to (Hepworth, 1953; Gordon 1964; Gordon et al., 1966).

According to Buckmaster (1992), however, the interest of scholars in the phenomenon of smoothing precedes these studies. He identifies at least thirty-four articles or books originally published between 1893 and 1953 in which income smoothing was explicitly or implicitly considered.

It is interesting to note that some authors initially considered "*smoothing*" to be a basic criterion deemed desirable for accounting. Johnson (1954) attempted to convince regulators to use smoothing as a quality principle for the selection of accounting requirements. He suggested that if economic policy aims to dampen business cycles, then smoothing quality should be a criterion for the acceptance of accounting methods. Gordon (1960) mentioned the "*stabilization of income*" as if it were a widely recognized criterion on par with conservatism. Dickens and Blackburn specified two criteria for accounting policy choice, conservatism and stabilized income, "*to provide the best possible basis for the stock-holders to project the earnings and financial condition of the corporation*" (Dickens & Blackburn, 1964).

However, smoothing does not meet the agreement of the preparers. In 1957, the American Accounting Association's Accounting and Reporting Standards reiterated the CAP's censure (1946, 1947A, 1947B) of "*artificial stabilization of the income series through the use of operating reserves*" (1957).

Furthermore, various articles (Anreder, 1962; Zeff & Maxwell, 1965) argue that there is no justification for making accounting choices based upon stabilizing income volatility through the application of a method. They censured income smoothing. Hendriksen (1965) reasoned, "*smoothing is not a desirable attribute of financial accounting particularly if it is artificial. The goal of smoothing confuses an operational goal of the firm with an accounting goal. If the results of operations are not, in fact, smooth, accounting should not make them appear as if they were*".

We have to highlight how, before the 1970s, most of the accounting research was narrative, descriptive, and based on general criteria, and Gordon et al. (1966) represented the beginning of modern earnings management research and the first empirical study that tested for income smoothing (see Dascher & Malcom, 1970; Imhoff, 1981; Buckmaster, 1992).

Only after the 1970s, as a consequence of the major methodological changes imposed on the entire business education system in the US (the so-called "*empirical revolution*"), did research start to widely provide evidence using a "*scientific*" approach (Whitley, 1986), and several explanations have been proposed to justify and test management's motivations for smoothing.

Traditionally, the income smoothing hypothesis has been tested to verify whether managers manage "*current reported earnings*" upwards (downwards) when the premanaged current performance (i.e., the performance before any type of manipulation) is below (above) a

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specific target. We refer to this as the "*current income smoothing hypothesis*" (e.g., Copeland & Licastro, 1968; Ronen & Sadan, 1981; Moses, 1987; Gaver et al., 1995; Young, 1998; Chaney et al., 1998).

Fundenberg & Tirole (1995) present a theory that predicts that the propensity of managers to engage in smoothing behavior in the current period is conditioned not only on their firm's current performance but also on its expected future performance. This is known as the "*anticipatory income smoothing hypothesis*". DeFond & Park (1997) provides evidence for the US consistent with the anticipatory income smoothing hypothesis.

The anticipatory hypothesis implies that the process of income smoothing incorporates managers' private knowledge regarding the firm's future performance (Miller & Rock, 1985). This informative earning smoothing hypothesis is reflected, among other things, by (Ronen & Sadan, 1981; Demski, 1998; Sankar & Subramanyam, 2001; Srinidhi et al., 2001; Kirschenheiter & Melumad, 2002; Goel & Thakor, 2003).

Taking inspiration from the Friedman hypothesis that consumers base consumption on permanent income, Chaney et al. (1998) propose an extension of the "*permanent earnings hypothesis",* in which managers not only relate dividend payouts with the permanent part of earnings claimed in income statements (Lee, 1996). But also use accruals to smooth reported earnings around their assessment of the firm's permanent earnings.

Furthermore, according to many studies, managers do not necessarily use earnings stabilization policies to communicate in a neutral manner (Michelson et al., 1995). Since stable earnings investments are perceived as less risky (Wang & Williams, 1994), income smoothing allows the company to reduce financing costs and increase the value of shares.

Dechow et al. (1995) provide evidence that firms manipulating earnings are able to enjoy a lower cost of capital (Amar et al., 2018). Trueman & Titman (1988) point out that high perceived earnings volatility increases the perceived bankruptcy probability of the firm and hence its borrowing cost (for a critical analysis see Newman, 1988). In contrast, a reduction in perceived risk will lead to a reduction in the return required by debt holders (Beidleman, 1973; Barnea et al., 1975).

Income smoothing is also important for optimizing the satisfaction of shareholders and their trust in the company (for a critical analysis sees Akpanuko et al., 2017). This, as a result, also reduces the demand for returns and increases firm value, while Bzeouich et al. (2019) find a negative relationship between overall earnings management and investment efficiency.

Hepworth in 1953 advanced the idea that stable earnings give owners and creditors more confidence in management because they obtain more certainty from their returns.

Gordon (1964) and Beidleman (1973) argued that income smoothing promotes a stable earnings series that can result in a higher share price.

Managers tend to smooth income to achieve tax savings or payment extension into the future (Tucker & Zarowin, 2006). Tax payments are linked to the income earned through a direct relationship (Bushra et al., 2017). Beattie et al. (1994) claimed that profit before tax was the income smoothing objective. Gordon et al. (1966) examined income smoothing by examining the relationship between the methods of accounting for investment tax credits. In a more recent study conducted by Michelson et al. (2000), pretax income was assumed to be the smoothing objective.

Additionally, the management of relations between administration and workers can promote smoothing. Since an increase in income can lead to workers asking for higher wages,

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administrators tend to regulate income in the event that this increase only occurs occasionally (Michael et al., 2015).

Finally, the variability in the income stream in larger companies can attract the attention of regulators, and exposure to supervision imposes costs, which implies another strong incentive to smooth income (Moses, 1987; Tamimi & Flayyih, 2015).

Many studies focus on the possibility that managers also use opportunistic income smoothing to obtain personal benefits and to enhance their own wealth.

According to Healy (1985), there is a direct relationship between income smoothing and management compensation plans; as bonus payments are often related to the extent of earnings, the use of income smoothing allows managers to better control these earnings and therefore bonus payments. The author argues that because the additional earnings will not always provide an additional bonus if the earnings are higher than the bound of the bonus plan, it no longer makes sense to increase reported earnings. Furthermore, in the event that current reported income is used as an evaluation benchmark for bonus payments in the future, managers have an incentive to reduce the benchmark. This will motivate managers to decrease extraordinary earnings as a buffer for future periods. Therefore, Gaver et al. (1995) reported that managers select income increases when earnings fall below the lower bound of their bonus plan. Additionally, Moses (1987) provides evidence that managers will enhance their future bonus compensation by shifting earnings to a subsequent period.

Another incentive to smooth income in favor of the manager is to reduce job security concerns.

Fundenberg & Tirole (1995) have investigated this relationship, finding that since companies do not engage managers on a long-term basis, in the event of poor current performance that could lead to a layoff, managers will try to shift profits from the future to the present.

In contrast, they find that managers in good times are less concerned about their position in the company and "*anticipate*" possible future negative performance (the so-called "*anticipatory hypothesis*"), shifting income from the current period to the future so that everything remains unchanged.

As we can see from this brief review, previous studies usually focus on researching the "*reasons*" and "*effects*" of income smoothing policies, but they do not go deeper into *"how"* this smoothing is accomplished (between oth, see also Bansal, 2021, Rachmawati, 2019).

Even previous research on "discretionary accruals" does not answer this question.

The first models, in fact (Healy, 1985; DeAngelo, 1986), were based on the unlikely and prescriptive idea that the "*nondiscretionary*" component of total accruals was constant and that the "*discretionary*" component should be reflected by a change in the historical series. Kaplan in 1985 remarked that the impact of changes in economic circumstances from one period to another should lead to a change in the level of nondiscretionary accruals (Kaplan, 1985).

Subsequent models from Jones (1991); Dechow (1994) (among others: Kothari et al., 2005; Jones et al., 2008; Stubben, 2010; Ecker et al., 2013) then insert additional control variables, but they are always based on the idea of dividing total accruals into "discretionary" and "nondiscretionary" ones by identifying time series irregularities: the accounting mechanisms of income smoothing and the characteristics of the individual accruals remain neglected.

An important distinction between these mechanisms to investigate "how" this smoothing is accomplished is instead that between "*real*" and "*artificial*" smoothing (Horwitz, 1977; Albrecht & Richardson, 1990).

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Real smoothing is also called "transactional" smoothing, as it occurs through real transactions with counterparties external to the company that are undertaken or not undertaken to smooth income.

Artificial smoothing, also named "*accounting*" smoothing, is achieved through accounting choices that are undertaken to shift revenues and costs from one period to another (Dascher & Malcom, 1970).

Hence, real smoothing precedes artificial smoothing in the sense that it is related to events that have occurred before artificial smoothing can take place; moreover, real smoothing has an effect on cash flow in contrast to artificial smoothing, which acts only on the book value.

In other words, once the cash flow has been smoothed by "*real*" transactions, "*artificial*" *smoothing*" tries to level the reported income through accounting techniques.

The research presents several attributes that make managers generally prefer real earnings management methods (Gunny, 2010; McVay, 2006; Schipper, 1989), especially after governance reform (Cohen et al., 2008; Ibrahim et al. 2020).

Huang et al. (2009) find that artificial smoothing using abnormal accruals is increasing in poor corporate governance, whereas Alhadab (2018) finds that real earnings management is negatively associated with abnormal audit fees.

In the literature, distinction real-artificial smoothing is usually associated with the following relationship:

$$NI=CFO+ACC \quad (1)$$

It is argued that to smooth net income (NI), real smoothing acts on cash flows from operations (CFO), and artificial smoothing acts on accrual values (ACC).

We are interested in artificial smoothing measures, but even when accepting the previous association (it will be discussed in the next paragraph), there is no univocal basis: the literature presents a large variety of definitions and empirical accrual measures.

Larson et al. (2018) organize these and classify 157 observations based on Compustat variables, identifying 40 separate measures of accruals. Thus, it emerges that most accrual papers in the survey likewise employ measures using data from the balance sheet (90.4%), while the others use the statement of cash flows. Excluding those that incorporate noncurrent accruals, we reclassify and present in the following table (Table 1) the different measures of accruals (ACC).

Previous research has a common basic approach in which once the accruals have been estimated, a correlation is sought between the smoothing effect and other external variables of interest (value of the firm, cost of debt, personal benefits, etc.).

However, there are no details on which dynamics follow each type of accrual to produce this smoothing effect: accruals often remain an exogenous variable.

Therefore, our study aims to answer the following research questions:

1. How much do the estimated income components of accruals influence the definition of reported income?
2. What are the levers of smoothing, i.e., when does cash flow from operations change, how do individual estimated accrual components change?
3. If it exists, what is the component of smoothing derived from the matching principle of competence and not from discretionary evaluation?

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Table 1 MEASURES OF ACCRUALS IN PRIOR LITERATURE	
Balance Sheet Approach	
1)	(ΔACT - ΔCHE) - (ΔLCT - ΔDLC)
2)	ΔACT - ΔLCT - ΔTXDITC - DP
3)	(ΔACT - ΔCHE) - (ΔLCT - ΔDLC) - DP
4)	(ΔACT - ΔCHE) - (ΔLCT - ΔDLC - ΔTXP) - DP
5)	ΔRECT + ΔINVT - ΔAP
6)	ΔRECT + ΔINVT + ΔACO - ΔAP - ΔTXP - ΔLCO
7)	ΔRECT + ΔINVT + ΔXPP - ΔAP -ΔTXP
8)	ΔRECT + ΔINVT + ΔACO - (ΔLCT - ΔTXP - ΔDLC) - DP
9)	ΔRECT + ΔINVT + ΔACO - ΔAP - ΔLCO - DP
Cash Flow Approach	
10)	(RECCH + INVCH + APALCH + TXACH + AOLOCH)
11)	(RECCH + INVCH + APALCH + TXACH + AOLOCH + DPC)

Note 1: Baber et al. (2011); Bushman et al. (2016); Core et al. (2008); DeFond and Park (2001); Geiger and North (2006) Hou (2015); Kim and Qi (2010); Lewellen and Resutek (2016); Lobo and Song (1989); Mashruwala and Mashruwala (2011); Mohanram (2014); Momente et al. (2015); Ogneva (2012); Resutek (2010); Richardson et al. (2005); Srinidhi and Gul (2007); Wilson (1986, 1987); Wongsunwai (2013) - 2) Rayburn (1986) - 3) Balsam et al. (2002); Barth and Hutton (2004); Bartov et al. (2000); Bhojraj and Swaminathan (2009); Calegari (2000); Callen and Segal (2004); Cohen and Lys (2006); Core et al. (2008); Ecker et al. (2013); Francis et al. (2005); Francis and Smith (2005); Guay et al. (1996); Gul et al. (2003); Heninger (2001); Hou (2015); Keung and Shih (2014); Kothari et al. (2005); Kothari et al. (2016); Krishnan et al. (2008); Linck et al. (2013); Louis and Robinson (2005); Louis et al. (2008); Pincus et al. (2007) - 4) Ali et al. (2008); Beneish and Vargus (2002); Chichernea et al. (2015); Desai et al. (2004); Guo and Jiang (2011); Kang et al. (2010); Khan (2008); Kraft et al. (2006); Lev and Nissim (2006); Mashruwala et al. (2006); Ohlson and Bilinski (2015); Sloan (1996) Wu et al. (2010); Zhang (2007); - 5) Bernard and Stober (1989) - 6) Bowen et al. (1987); Dechow (1994); Pfeiffer et al. (1998); Pfeiffer and Elgers (1999) - 7) Givoly and Hayn (2000) - 8) Rees et al. (1996) - 9) Arif et al. (2016); Fairfield et al. (2003) - 10) Baber et al. (2011); Bushman et al. (2016); Core et al. (2008); DeFond and Park (2001); Geiger and North (2006); Hou (2015); Kim and Qi (2010); Lewellen and Resutek (2016); Lobo and Song (1989); Mashruwala and Mashruwala (2011); Mohanram (2014); Momente et al. (2015); Ogneva (2012); Resutek (2010); Richardson et al. (2005); Srinidhi and Gul (2007); Wilson (1986, 1987); Wongsunwai (2013) - 11) Chung and Kallapur (2003); Hribar and Collins (2002).

Note 2: ACO (Current Assets Other Total); ACT (Current Assets - Total); AOLOCH (Assets and Liabilities Other Net Changes); AP (Accounts Paiables Trade); APALCH (Accounts Payable and Accrued Liabilities -Changes); CHE (Cash and Short-Term Investments); DLC (Debt in Current Liabilities - Total); DP (Depreciation and admortization); DPC (Depreciation and admortization); INVCH (Inventory Changes); INVT (Inventories); LCO (Current liabilities Other Total); LCT (Current Liabilities - Total); RECCH (Account receivables Changes) RECT (Receivables Total) TXACH (Income taxes Accrued Changes); TXDITC (Deferred Taxes and Investment Tax Credit); TXP (Income taxes Payables); XPP (Prepaid expenses).

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METHODOLOGY

The first aspect to be addressed is a more accurate classification of accruals in the context of income smoothing policies.

We are interested in "*artificial smoothing*". As previously examined, this smoothing, being achieved through estimates and accounting choices following real smoothing, is based on subjective evaluations (it is not measured by the objective exchange of money or objectively contracted values), and it has no effect on cash flow (in contrast to real smoothing). Essentially, by definition, it coincides with "*adjusting entries*".

As shown earlier, previous research examines total accruals (ACC) as a variable on which managers can act to level the cash flows from operations (CFO) and stabilize net income (NI).

However, if we look carefully, this contrasts with the possibility of separating *"real"* from *"artificial"* smoothing, as previously defined. In fact, in so doing, we include in the analysis the decrease (increase) in accounts receivable and the increase (decrease) in accounts payable; therefore, accruals include the effect of managing changes in payment timing.

This implies the potential inclusion of voluntary changes in external contractual relationships, and undoubtedly this act on cash flows; this is clearly a manipulation of real activities; thus, this is "*real smoothing*". Moreover, McNichols (2000); Melumad & Nissim (2008); Beneish et al. (2013); Revsine et al. (2004) have observed that the practice of factoring/securitizing receivables adds noise, reducing the statistical power of discretionary accruals as an indicator of accrual-based earnings management.

Therefore, unlike previous research:

1. To avoid this overlap between "accounting" and "real" smoothing, we exclude from the "cash flows from operation" (CFO) the changes in operating receivables and liabilities arising out of transactions with external economies, which are usually included in the accruals (ACC).
2. We will use the income statement as the main document for analyzing accounting income smoothing.

Referring to the income statement, the Compustat accrual codes (ACC) of previous research become:

$$ACC = \Delta RECT - \Delta AP + INVCH - DPC + CAPCST - PRV + AEDI + AFA + TXACDC \quad (2)$$

As schematized in Figure 1, thus eliminating from relationship 1 the changes in operating receivables and liabilities ΔRECT and ΔAP, we have:

$$NI = CFO + ACC \quad (1)$$

$$CFO = CFO^* - (\Delta RECT - \Delta AP) \quad (3)$$

$$ACC = ACC^* + (\Delta RECT - \Delta AP) \quad (4)$$

$$NI = CFO^* + ACC^* \quad (5)$$

Therefore, CFO* can be identified with the "*unadjusted income*", i.e., with the income determined at the end of the year, by "*transactional entries*", which, as previously defined, are subject to "*real*" income smoothing.

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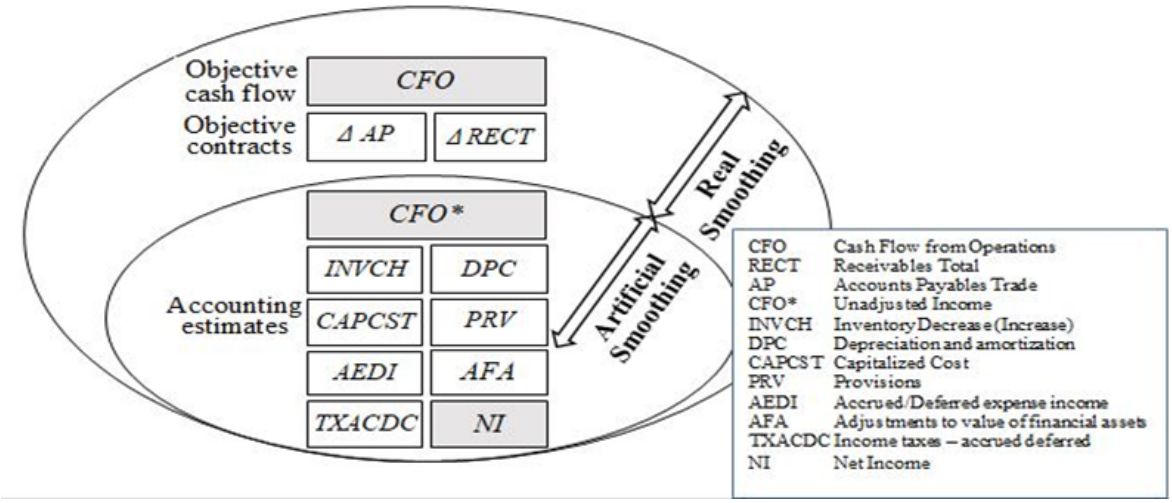

Figure 1
ARTIFICIAL AND REAL SMOOTHING

It is only with the accruals that remain (ACC*), i.e., those that result from the "*adjusting entries*" (which do not affect the cash flow and/or external contractual relationships), that "accounting smoothing" as previously defined can be performed.

$$ACC^{*} = INVCH - DPC + CAPCST - PRV + AEDI + AFA + TXACDC \quad (6)$$

To answer the first research question concerning the weight of the estimated components on the definition of reported income, we collect data relating to the variables previously identified (see relationships 3 and 4) for each firm *"i"* for each year *"t"* (where t varies from 0 to -5).

Each value is then scaled by the sales resulting from the last income statement (t=0) and multiplied by 1,000 for easier reading $(\frac{1,000}{sales_{i0}})$[1].

To answer the second research question, i.e., the smoothing effect of individual estimated accruals (ACC*) on unadjusted income flow (CFO*), we must further deepen the analysis.

First, compared to many previous studies, we consider it essential to determine changes for each company, and therefore, for each company, we subtract the values reported each year from the values reported the previous year:

$$(NI_{it} - NI_{i(t-1)}) = (CFO^{\star}_{it} - CFO^{\star}_{i(t-1)}) + (ACC^{\star}_{it} - ACC^{\star}_{i(t-1)})$$

$$\Delta NI = \Delta CFO^{*} + \Delta \mathrm{ACC}^{*} \quad (9)$$

Each value is again scaled by the sales resulting from the last income statement (*t*=0) and multiplied by 1,000 for easier reading $(\frac{1,000}{sales_{i0}})$

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To analyze the question further, we set up a regression analysis. Each value is again scaled by sales from the last income statement (t=0) and multiplied by 1,000 for easier reading $(\frac{1{,}000}{\text{sales}_{i0}})$

As control variables, we enter the size (total assets - TA), sector (industry) and stock exchange listing (list):

1) $\Delta ACC^{*}{}_{it} = \alpha_0 + \alpha_1 \Delta CFO^{*}_{it} + \alpha_2 TA_{it} + \alpha_3 industry_{it} + \alpha_4 list_{it} + \in$

2) $\Delta INVH_{it} = \alpha_0 + \alpha_1 \Delta CFO^{*}_{it} + \alpha_2 TA_{it} + \alpha_3 industry_{it} + \alpha_4 list_{it} + \in$

3) $\Delta DPC_{it} = \alpha_0 + \alpha_1 \Delta CFO^{*}_{it} + \alpha_2 TA_{it} + \alpha_3 industry_{it} + \alpha_4 list_{it} + \in$

4) $\Delta CAPCST_{it} = \alpha_0 + \alpha_1 \Delta CFO^{*}_{it} + \alpha_2 TA_{it} + \alpha_3 industry_{it} + \alpha_4 list_{it} + \in$

5) $\Delta PRV_{it} = \alpha_0 + \alpha_1 \Delta CFO^{*}_{it\,it} + \alpha_2 TA_{it} + \alpha_3 industry_{it} + \alpha_4 list_{it} + \in$

6) $\Delta AEDI_{it} = \alpha_0 + \alpha_1 \Delta CFO^{*}_{it} + \alpha_2 TA_{it} + \alpha_3 industry_{it} + \alpha_4 list_{it} + \in$

7) $\Delta AFA_{it} = \alpha_0 + \alpha_1 \Delta CFO^{*}_{it\,it} + \alpha_2 TA_{it} + \alpha_3 industry_{it} + \alpha_4 list_{it} + \in$

8) $\Delta TXACDC_{it} = \alpha_0 + \alpha_1 \Delta CFO^{*}_{it} + \alpha_2 TA_{it} + \alpha_3 industry_{it} + \alpha_4 list_{it} + \in$

9) $\Delta \mathrm{NI}_{\mathrm{it}} = \alpha_0 + \alpha_1 \Delta \mathrm{CFO}^{*}_{\mathrm{it}\,\mathrm{it}} + \alpha_2 \mathrm{TA}_{\mathrm{it}} + \alpha_3 \mathrm{industry}_{\mathrm{it}} + \alpha_4 \mathrm{list}_{\mathrm{it}} + \in$

Finally, the third research question, concerning the existence of a smoothing effect deriving just from the matching principle (and not from the discretionary evaluation of managers), requires a different verification. Mathematical verification will be developed in the next paragraph.

The sample we analyze is taken from the Aida database (Bureau van Dijk) by selecting Italian nonfinancial companies required to prepare statements that exceed 40 million in total assets (structural dimension) and 50 million in revenue (operational dimension). The choice of these dimensional limits was dictated by the need to limit the sample size by choosing larger companies, normally with more complete financial statements and developed administrative systems.

To avoid startups, we selected companies that have continuously drawn up financial statements over the past 10 years.

We selected 4,426 companies and then extracted financial statement data over the past 6 years (over 22,600 observations).

Not all financial statements clearly and completely report the values of the items subject to analysis.

We therefore eliminated financial statements for those years where the data were incomplete. After further removing outliers, in total, we obtain 22,695 firm-year observations Table 2.

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Table 2 SAMPLE COMPOSITION		
Industry	**Firms**	**Obs.**
A – Agriculture, forestry and fishing	45	241
B – Mining and quarrying	9	34
C – Manufacturing	1,842	9,629
D – Electricity, gas, steam and air conditioning supply	124	621
E – Water supply; sewerage; waste management and remediation activities	77	382
F – Construction	141	582
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	916	4,872
H – Transporting and storage	168	815
I – Accommodation and food service activities	35	178
J – Information and communication	162	766
K – Financial and insurance activities	2	12
L – Real estate activities	152	754
M – Professional, scientific and technical activities	531	2,706
N – Administrative and support service activities	136	681
O – Public administration and defense; compulsory social security	1	3
P – Education	1	6
Q – Human health and social work activities	53	282
R – Arts, entertainment and recreation	19	75
S – Other services activities	12	56
Listing	**Firms**	**Obs.**
Listed companies	177	857
Unlisted companies	4,249	21,838
Legal Form	**Firms**	**Obs.**
Società per Azioni (S.p.A.)	3,084	15,845
Società a Responsabilità Limitata (S.R.L.)	1,092	5553
Other forms	250	1297
Observation		22 695
Firms		4,426

Notes: The sample includes 6-year observations of Italian companies with the complete financial data, available on database Aida (Bureau van Dijk), for companies that have more than 40 million in total assets (structural dimension) and 50 million in revenue (operational dimension) and have continuously drawn up financial statements over the past 10 years. We exclude financial institutions.

Citation Information: Cecchi, M. (2021). The accounting mechanisms behind income smoothing. *Academy of Accounting and Financial Studies Journal, 25*(6), 1-26.

RESULTS AND DISCUSSION

The influence of the estimated income components of accruals on net income (first research question) is shown in Table 3.

Table 3
DESCRIPTIVE STATISTICS

	Mean %	Mean	Std. dev.	Q1	Median	Q3
CFO*	100%	66.37	119.86	17.58	50.2	95.75
ACC*	-60%	-39.83	102.59	-58.71	-27.72	-6.04
+ INVCH	10.20%	6.74	67.63	-3.38	0.5	12.73
- DPC	61.60%	40.86	80.33	11.67	26.71	47.83
+ CAPCST	4.70%	3.09	17	0	0	0.36
- PRV	11.20%	7.44	16.68	0.75	2.4	7.22
+ AEDI	-0.50%	-0.3	15.96	-1.07	0	1.08
+ AFA	-1.40%	-0.96	10.21	0	0	0
- TXACDC	1.10%	0.7	8.88	-0.61	0	1.62
NI	40%	26.54	64.64	2.36	16.75	44.48

Notes: n 22,695 observations. CFO*=Unadjusted Income; ACC*=Estimated Accruals; INVCH=Inventory decrease/increase; DPC=Depreciation and amortization; CAPCST=Capitalized Cost; PRV=Provisions; AEDI= Accrued/deferred expense income; AFA=Adjustments to value of financial assets; TXACDC= Accrued/deferred income taxes; NI=Net Income. ACC*=INVCH-DPC+CAPCST-PRV+AEDI+AFA-TXACDC (relationship 6).

We can observe that the average value of income estimated accruals (ACC*) is very important and is largely negative.

On average, unadjusted income (CFO*) is 66.37, and the estimated values (ACC*) reduce this flow by -39.83, bringing the average profit (NI) to 26.54.

In percentage terms, on average, estimated accruals (ACC*) reduce unadjusted income (CFO*) by 60%, bringing the average profit (NI) to 40%.

The most important negative value of the samples analyzed is given by depreciation and amortization (DPC is 40.86, equal to 61.6%), and the greatest positive value is given by the change in inventories (INVCH is 6.74, equal to the table is illegible).

If we exclude depreciation and provisions, which are always negative, the other accruals have a median of approximately zero, and we can observe some asymmetries in the distributions.

Table 4 highlights the differences by sector of activity (NACE industry codes). These, as expected, are very prominent.

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Table 4.
DESCRIPTIVE STATISTICS BY SECTOR

INDUSTRY	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*	*P*	*Q*	*R*	*S*	*TOT*
N	*241*	*34*	*9,629*	*621*	*382*	*582*	*4,872*	*815*	*178*	*766*	*12*	*754*	*2,706*	*681*	*3*	*6*	*282*	*75*	*56*	*22695*
CFO*	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ACC*:	-65.0%	-76.3%	-52.3%	-56.7%	-82.3%	-29.3%	-56.7%	-72.3%	-59.9%	-76.9%	-46.0%	-62.5%	-62.5%	-77.1%	-100.0%	-41.4%	-72.8%	-89.8%	-82.4%	-60.0%
+ *INVCH*	31.6%	-0.1%	9.8%	-0.3%	0.7%	164.1%	14.9%	2.7%	1.1%	2.0%	5.6%	12.7%	10.3%	7.4%	0.0%	0.0%	0.6%	0.3%	-1.1%	10.2%
- *DPC*	89.3%	68.6%	54.9%	55.8%	76.0%	162.2%	57.5%	59.4%	52.1%	72.5%	53.8%	66.0%	65.9%	74.5%	28.5%	158.1%	45.7%	89.4%	78.1%	61.6%
+ *CAPCST*	3.5%	4.4%	3.9%	9.5%	14.7%	23.1%	2.4%	1.6%	0.8%	4.7%	7.0%	3.8%	6.0%	1.0%	0.0%	116.8%	1.2%	6.7%	1.2%	4.7%
- *PRV*	9.6%	4.6%	8.8%	10.3%	25.3%	39.0%	13.6%	14.5%	7.9%	10.3%	3.9%	9.6%	9.9%	10.4%	51.7%	5.1%	24.6%	9.4%	5.6%	11.2%
+ *AEDI*	1.7%	0.6%	0.0%	-0.8%	-6.2%	1.9%	0.0%	0.2%	-1.0%	-0.5%	-0.3%	0.5%	-0.3%	-1.3%	22.6%	-1.5%	0.7%	-3.6%	-2.3%	-0.5%
+ *AFA*	-0.7%	-1.0%	-1.6%	-0.2%	-0.8%	-5.9%	-2.4%	-1.3%	-2.1%	-0.5%	-0.1%	-0.7%	-1.6%	-0.9%	0.0%	6.0%	-1.7%	0.3%	-0.6%	-1.4%
- *TXACDC*	-1.2%	5.9%	0.8%	0.4%	1.8%	7.5%	0.6%	1.2%	0.6%	0.9%	1.1%	2.1%	1.6%	1.0%	-2.9%	2.6%	1.8%	1.9%	0.5%	1.1%
NI	35.0%	23.7%	47.7%	43.3%	17.7%	70.7%	43.3%	27.7%	40.1%	23.1%	54.0%	37.5%	37.5%	22.9%	0.0%	58.6%	27.2%	10.2%	17.6%	40.0%
CFO*	29.84	130.63	66.94	123.32	150.23	29.45	33.13	99.92	94.84	108.90	87.08	72.45	70.77	85.85	2.99	56.12	86.68	320.98	141.68	66.37
ACC*	-19.40	-99.73	-34.98	-69.94	-123.62	-8.63	-18.77	-72.27	-56.79	-83.70	-40.06	-45.28	-44.20	-66.19	-2.99	-23.25	-63.12	-288.36	-116.80	-39.83
NI	10.45	30.90	31.96	53.38	26.62	20.81	14.36	27.65	38.05	25.20	47.02	27.17	26.57	19.66	0.00	32.87	23.56	32.62	24.87	26.54

Notes: n 22,695 observations. CFO*=Unadjusted Income; ACC*=Estimated Accruals; INVCH=Inventory decrease/increase; DPC=Depreciation and amortization; CAPCST=Capitalized Cost; PRV=Provisions; AEDI= Accrued/deferred expense income; AFA=Adjustments to value of financial assets; TXACDC= Accrued/deferred income taxes; NI=Net Income. ACC*=INVCH-DPC+CAPCST-PRV+AEDI+AFA-TXACDC (relationship 6)

NACE codes: A=agriculture, forestry and fishing; B=mining and quarrying; C=manufacturing; D=electricity, gas, steam and air conditioning supply; E=water supply; sewerage; waste management and remediation activities; F=construction; G=wholesale and retail trade; repair of motor vehicles and motorcycles; H=transporting and storage; I=accommodation and food service activities; J=information and communication; K=financial and insurance activities; L=real estate activities; M=professional, scientific and technical activities; N=administrative and support service activities; O=public administration and defense; compulsory social security; P=education; Q=human health and social work activities; R=arts, entertainment and recreation; S=other services activities; T=activities of households as employers; undifferentiated goods - and services - producing activities of households for own use; U=activities of extraterritorial organizations and bodies.

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We exclude sectors O and P, as they have an overly limited number of cases from which to draw a statistically significant conclusion. The estimated provisions have an impact that varies from 89.8% of the CFO* (sector Q) to 29.3% (sector F).

The composition of single accruals (ACC*) is also very varied. For the change in inventories (INVCH), we drop from 164% (sector F) to almost zero (sectors B, D, E, O, P, R, S). Depreciation (DPC) varies between 162% of the CFO * (sector F) and 45.7% in sector Q.

Capitalization (CAPCST) varies from 23.1% in sector F to 0.8% in sector I. Write downs (PRV) vary between 39% (sector F) and 4% (sector B).

The other accruals generally have a rather low incidence. We point out for sector F the value adjustments of financial assets (AFA) of -5.9% and accrued and deferred income taxes (TXACDC) of 7.5% of the CRO*.

The dynamics of the variation of the estimated components of income as the cash flow varies (second research question) are represented in the following figures and tables.

Figure 2 shows the distributions of the change in net income (ΔNI – Figure 2a) and in the estimated accruals (ΔACC* - Figure 2b) achieved by varying the flow of unadjusted income (ΔCFO*).

Therefore, we can see the evident smoothing effect made by accruals (ΔACC*) on unadjusted income (ΔCFO*) to obtain net income (ΔNI).

However, not all of them have the same impact. In particular, a result clearly emerges: while the effect of the changes in inventory (ΔINVCH - Figure 2c) is marked, even if they exist, the effects of the other changes seem modest.

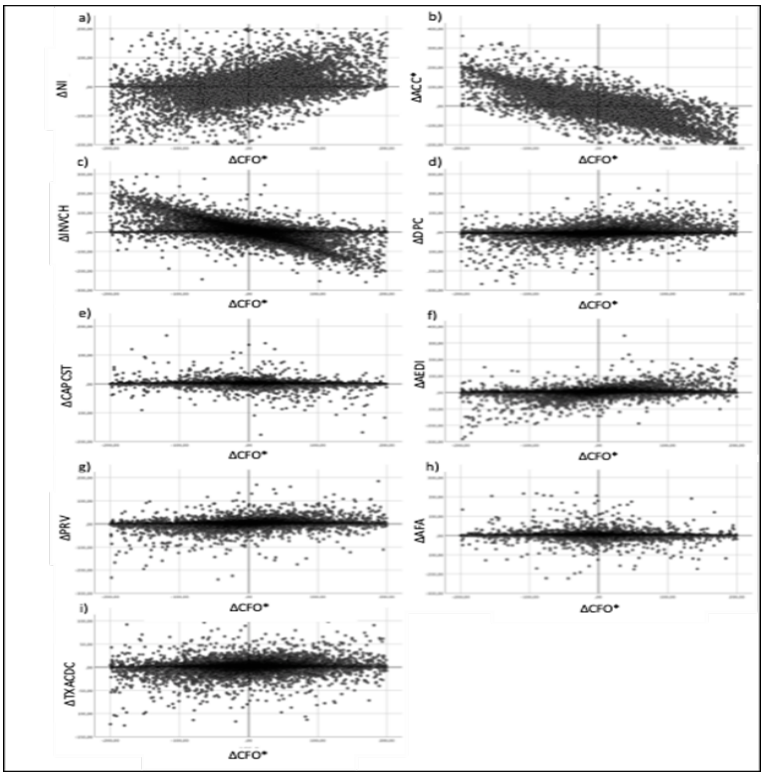

Figure 2
DISTRIBUTION OF THE VALUE OF NET INCOME AND ESTIMATED ACCRUALS

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For a more precise evaluation, we present the correlation table between the variables under examination Table 5.

Table 5
CORRELATION MATRIX

		0	1	2	3	4	5	6	7	8	9
0	ΔCFO*		-.780**	-.655**	.239**	-.068**	.186**	.234**	-.040**	.138**	.400**
1	ΔACC*	-.767**		.738**	-.381**	.075**	-.304**	-.259**	.218**	-.228**	.262**
2	ΔINVCH	-.614**	.721**		.029**	-.028**	.034**	.015*	0	.017**	.071**
3	ΔDPC	.211**	.300**	.025**		.099**	.180**	-.141**	0.006	.146**	-.190**
4	ΔCAPCST	-.052**	.043**	0.01	.045**		0.008	0.006	-0.004	.024**	0.004
5	ΔPRV	.190**	-.251**	.017*	.353**	0.012		-.023**	0.009	.103**	-.159**
6	ΔAEDI	.183**	-.207**	0.001	-.022**	-.014*	-.015*		.022**	-.138**	-.019**
7	ΔAFA	-.033**	.103**	0.002	-.015*	-0.007	-.025**	0.004		-0.011	. 257**
8	ΔTXACDC	.125**	-.219**	0.011	-.131**	0.009	.179**	0.005	.023**		-.122**
9	ΔNI	.400**	.130**	.042**	-.054**	-.029**	-.020**	0.001	.089**	-.099**	

Notes: This table presents average quarterly Pearson (above diagonal) and Spearman (below diagonal) correlations for the variables used in the study. ** Correlation is significant at the 0.01 level (2 tailed). * Correlation is significant at the 0.05 level (2-tailed) - 22,695 observations. CFO*= Unadjusted Income; ACC*= Estimated Accruals; INVCH= Inventory Decrease/Increase; DPC= Depreciation and amortization; CAPCST= Capitalized Cost; PRV= Provisions; AEDI=Accrued/Deferred expense income; AFA= Adjustments to value of financial assets; TXACDC= Accrued/Defered Income taxes; NI= Net Income

The negative correlation between ΔACC* and ΔCFO* is measured with a very high negative coefficient of -0.767.

Examining the individual accruals, the most important effect is determined, as expected, by the change in inventory (the variation in the variation, to be precise) ΔINVCH, which is equal to -0.614.

The smoothing effect of amortization and depreciation ΔDPC, even if present, is modest on average, compensated by the effect of the change in the accrued/deferred expense income ΔAEDI.

The results are reported in Table 6.

Table 6
THE RELATION BETWEEN CHANGES IN UNADJUSTED EARNING AND ESTIMATED ACCRUALS

	Dependent variables								
	1	2	3	4	5	6	7	8	9
	ΔACC*	ΔINVCH	ΔDPC	ΔCAPCST	ΔPRV	ΔAEDI	ΔAFA	ΔTXACDC	ΔNI
ΔCFO*	-0.739**	-0.482**	0.086**	-0.010**	0.044**	0.083**	-0.008**	0.027**	0.261**
	(-188.23)	(-131.60)	-37.58	(-11.87)	-28.95	-39.63	(-5.43)	-22.24	-66.55
Intercept	0.803	0.456	0.533	-0.122	-0.178	-0.377	0.199	-0.249	0.803
	-0.41	-0.25	0.46	(-0.30)	(-0.23)	(-0.36)	-0.28	(-0.41)	-0.41
Control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes
Adjusted R^2	0.61	0.434	0.062	0.009	0.037	0.069	0.002	0.023	0.165
N	22,695	22,695	22,695	22,695	22,695	22,695	22,695	22,695	22,695

Notes: t-Values are presented in parentheses. **Two-tailed significance at 0.01 level. For each regression F value= 0; Durbin-Watson value around 2;
CFO*= Unadjusted Income; ACC*= Estimated Accruals; INVCH= Inventory Decrease/Increase; DPC= Depreciation and amortization; CAPCST= Capitalized Cost; PRV= Provisions; AEDI=Accrued/Deferred expense

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income; AFA= Adjustments to value of financial assets; TXACDC= Accrued/Defered Income taxes; NI= Net Income.

ΔACC* has a coefficient of -0.739 and an R2 of 0.610, confirming the smoothing effect. However, the greatest impact is that of ΔINVCH, which has a coefficient of -0.482 and an R2 of 0.434. This study reveals a strong negative correlation between the change in unadjusted income ΔCFO* and the change in inventory value variation ΔINVCH.

This could suggest that a change in inventory values is used by management to implement a systematic smoothing of net income.

The correlation between ΔCFO* and the other estimated accruals (ΔDPC, ΔCAPCST, ΔPVR, ΔAEDI, ΔAFA, ΔTXCDC) is much weaker, and the control variables (legal form, size and sector) do not play a significant role.

This brings us to the third research question, relating to the possible existence of a consistent smoothing effect deriving from the principle of matching rather than from the discretionary evaluation of managers.

To examine this issue in depth, we consider a stylized example. Assume that a company has cash transactions solely generated from the purchase of merchandise for a quantity QP at a price PP and from the sale of the same merchandise for a quantity Q_S at a price P_S (so CFO=CFO*). Thus:

$$CFO^{\star} = Q_S \cdot P_S - Q_P \cdot P_P$$

Comparing two years and assuming that the prices P_S and P_P remain unchanged, we have:

$$\Delta CFO^{\star} = \Delta Q_S \cdot P_S - \Delta Q_P \cdot P_P$$

To derive the net income (NI) from this cash flow $CFO^{\star}$according to the matching principle, we must take into account the changes in inventory ΔINVCH.

Not having other accruals$\Delta CFO^{*} = \Delta CFO$ relationship 4 is equal to 1:

$$\Delta NI = \Delta CFO^{*} + \Delta INVCH$$

Sales reduce inventory, and for the moment, we assume that the "*unloading price*" (P_U) remains unchanged over the period considered ($P_U^1 = P_U^0 = P_U$); therefore, there is no subjective estimate. We have:

$$\Delta INVCH = \Delta Q_P \cdot P_P - \Delta Q_S \cdot P_U$$

Thus, given that $\Delta NI = \Delta CFO^{*} + \Delta INVCH$, then: $\Delta NI = \Delta Q_S \cdot (P_S - P_U)$

Evidently, with the condition$P_U^1 = P_U^0$, the change in net income is equal to 0 ($\Delta NI = 0$) only when the sales do not change ($\Delta Q_S = 0$) or the unloading price is equal to the selling price (P_U=P_S).

It is easy to verify that even when $P_U^1 = P_U^0$, we can still have a "*smoothing effect*" at any time (see appendix 1):

$$\frac{P_U}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \quad (10)$$

In figure 3, we present a schematization.

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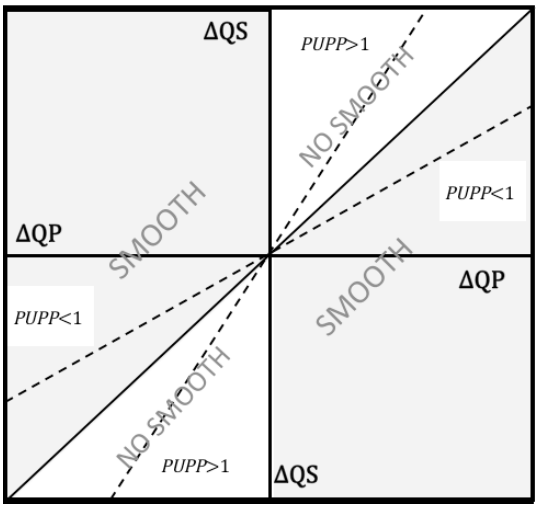

Figure 3
THE "*OBJECTIVE*" SMOOTHING EFFECT OF CHANGE IN INVENTORIES

From the examination of Figure 3, it is evident that the gray area is preeminent. With$P_U = P_P$, 75% (25%+25%+12.5%+12.5%) of possible variations in purchases (ΔQ_P) and sales (ΔQ_S) lead to a smoothing effect (gray area).

This percentage increases when $P_U > P_P$ and decreases when $P_U < P_P$, but the smoothing area remains the largest. If $\frac{P_U}{P_P} = 0.9$, the smoothing area is 72.5% (25%+25%+11.25%+11.25%).

It is equally evident that this effect should not be considered when we analyze the discretionary choices of managers to regularize income flows, as it is an accounting effect of the matching principle. It is an accounting mechanism.

Returning to the previous example, let us assume the following values:

1) $\Delta Q_S = 100; \cdot \Delta Q_P = 100; P_S = 4;\ P_P = 2;\ P_U = 3\ then =\ \Delta CFO^* = 200;\ \Delta INVCH = -100;\ \Delta NI = 100$
2) $\Delta Q_S = -100; \cdot \Delta Q_P = -100; P_S = 4;\ P_P = 2;\ P_U = 3\ then =\ \Delta CFO^* = -200;\ \Delta INVCH = 100;\ \Delta NI = -100$

However, if:

1) $\Delta Q_S = 100; \cdot \Delta Q_P = 100; P_S = 4;\ P_P = 2;\ P_U = 1\ then =\ \Delta CFO^* = 200;\ \Delta INVCH = 100;\ \Delta NI = 300$
2) $\Delta Q_S = -100; \cdot \Delta Q_P = -100; P_S = 4;\ P_P = 2;\ P_U = 1\ then =\ \Delta CFO^* = -200;\ \Delta INVCH = -100;\ \Delta NI = -300$

The "*objective*" smoothing given by the matching principle can, however, be added to an "*evaluative*" smoothing effect, given by the different assessments of the unloading price (P_U) between years 0 and 1 ($P_U^1 \neq P_U^0$).

The assessment of the unloading price P_U may undergo variations due to internal estimates, such as devaluations, or to the consumption of different layers obtained by applying the LIFO or FIFO method.

Let us therefore assume that the prices P_S and P_P always remain constant over the two years (external market condition).

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In this case, the change in inventories consists of an objective $\Delta\text{INVCH}^{\text{Ob}}$ accounting change (given by the change in inventories at unchanged unloading prices) and the evalutative change due to the variation in the unloading price $\Delta\text{INVCH}^{\text{Ev}}$:

$$\Delta\text{INVCH} = \Delta\text{INVCH}^{\text{Ob}} + \Delta\text{INVCH}^{\text{Ev}}$$

$$\Delta\text{INVCH} = (\text{Q}_\text{P}^1 \cdot \text{P}_\text{P} - \text{Q}_\text{S}^1 \cdot \text{P}_\text{U}^1) - (\text{Q}_\text{P}^0 \cdot \text{P}_\text{P} - \text{Q}_\text{S}^0 \cdot \text{P}_\text{U}^0)$$

$$\Delta\text{INVCH} = \underbrace{\Delta\text{Q}_\text{P} \cdot \text{P}_\text{P} - \Delta\text{Q}_\text{S} \cdot \text{P}_\text{U}^0}_{\Delta\text{INVICH}^{\text{Ob}}} \underbrace{- \text{Q}_\text{S}^1 \cdot (\text{P}_\text{U}^1 - \text{P}_\text{U}^0)}_{\Delta\text{INVCH}^{\text{Ev}}}$$

In this case, it is possible to determine a discharge price P_U^{1*} for which complete smoothing is obtained (see appendix 2):

$$\text{P}_\text{U}^{1*} = \text{P}_S - \frac{\text{Q}_\text{S}^0}{\text{Q}_\text{S}^1} \cdot (\text{P}_S - \text{P}_\text{U}^0)$$

Taking the previous examples:

1) $\Delta\text{Q}_S = 100; \cdot \Delta\text{Q}_P = 100; \text{P}_\text{S} = 4;\ \text{P}_\text{P} = 2;\ P_U^0 = 3\ then = \ \Delta\text{CFO}^* = 200$

e.g., if we pose: $\text{Q}_\text{S}^0 = 100;\ \text{Q}_\text{S}^1 = 200;\cdot\ \text{Q}_\text{P}^0 = 100; \text{Q}_\text{P}^1 = 200$

$$\text{P}_\text{U}^{1*} = \text{P}_S - \frac{\text{Q}_\text{S}^0}{\text{Q}_\text{S}^1} \cdot (\text{P}_S - \text{P}_\text{U}^0) = 4 - \frac{100}{200} \cdot (4 - 3) = \ 3.5$$

$$\begin{array}{lllll} \Delta\text{INVCH}^{\text{Ob}} = & \Delta\text{Q}_\text{P} \cdot \text{P}_\text{P} - \Delta\text{Q}_\text{S} \cdot \text{P}_\text{U}^0 & = & 100 \cdot 2 - 100 \cdot 3 = & -100 \\ \Delta\text{INVCH}^{\text{Ev}} = & -\text{Q}_\text{S}^1 \cdot (\text{P}_\text{U}^1 - \text{P}_\text{U}^0) & = & -200 \cdot (3.5 - 3) = & -100 \\ \hline \Delta\text{INVCH} = & \Delta\text{INVCH}^{\text{Ob}} + \Delta\text{INVCH}^{\text{Ev}} = & -100 - 100 & = & -200 \end{array}$$

So:$\Delta\text{CFO}^* + \ \Delta\text{INVCH} = 200 - 200 = \Delta\text{NI} = 0$

The change in unadjusted income (ΔCFO^*), which is equivalent to an increase of 200, is perfectly compensated for by the change in inventories (ΔINVCH) of -200.

This effect is archived by *"objective"* smoothing, that is, without manipulation of the unloading prices, as $\Delta\text{INVICH}^{\text{Ob}} = -100$ and by *"evaluative"* smoothing, that is, bringing the unloading prices from 3 to 3.5 as $\Delta\text{INVICH}^{\text{Ev}} = -100$.

2) $\Delta\text{Q}_S = -100; \cdot \Delta\text{Q}_P = -100; \text{P}_\text{S} = 4;\ \text{P}_\text{P} = 2;\ P_U^0 = 3\ then = \ \Delta\text{CFO}^* = -200$

e.g., if we pose: $\text{Q}_\text{S}^0 = 200;\ \text{Q}_\text{S}^1 = 100;\cdot\ \text{Q}_\text{P}^0 = 200; \text{Q}_\text{P}^1 = 100$

$$\text{P}_\text{U}^{1*} = \text{P}_S - \frac{\text{Q}_\text{S}^0}{\text{Q}_\text{S}^1} \cdot (\text{P}_S - \text{P}_\text{U}^0) = 4 - \frac{200}{100} \cdot (4 - 3) = \ 2$$

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$$\begin{array}{lllll} \Delta\text{INVCH}^{\text{Ob}} = & \Delta Q_P \cdot P_P - \Delta Q_S \cdot P_U^0 & = & -100 \cdot 2 - (-100) \cdot 3 = & +100 \\ \Delta\text{INVCH}^{\text{Ev}} = & -Q_S^1 \cdot (P_U^1 - P_U^0) & = & -100 \cdot (2-3) \quad = & +100 \\ \hline \Delta\text{INVCH} = & \Delta\text{INVCH}^{\text{Ob}} + \Delta\text{INVCH}^{\text{Ev}} = & & +100 + 100 \quad = & +200 \end{array}$$

So: $\Delta\text{CFO}^{*} + \Delta\text{INVCH} = -200 + 200 = \Delta\text{NI} = 0$

In this case, the change in unadjusted income (ΔCFO^{*}), which is equivalent to a decrease of 200, is perfectly compensated by the change in inventories (ΔINVCH) of +200.

This effect is archived by *"objective"* smoothing, that is, without manipulation of the unloading prices, as $\Delta\text{INVICH}^{\text{Ob}} = +100$, and by *"evaluative"* smoothing, that is bringing the unloading prices from 3 to 2 as $\Delta\text{INVICH}^{\text{Ev}} = +100$.

CONCLUSION

Most empirical studies on income smoothing consider the dumping effect of accruals, but often the analysis of the accounting mechanisms by which they act remains at a superficial level. Accruals are divided into *"discretionary"* and *"nondiscretionary"* on the basis of deviations from historical trends, and then investigations deepen their focus on the relationship between discretionary accruals and specific variables of interest, such as the value of the company and the cost of debt.

Our research differs from these, since our focus was on the accounting mechanism adopted by companies to smooth income by accruals, i.e., on "artificial smoothing".

This type of smoothing, obtained through estimates, is based on subjective evaluations and accounting choices. Therefore, it differs and follows the so-called "real smoothing", and by its nature, it cannot have any effect on cash flow.

From this, it follows that artificial smoothing cannot be implemented by managing changes in payment times (real smoothing). Thus, unlike previous studies, we propose a methodology that excludes changes in operating receivables and liabilities from total accruals and from cash flow.

After identifying the sample by selecting 4,426 Italian companies (22,695 firm-year observations), we first estimate the weight of the accruals previously defined in determining the net income (first research question). We thus observe that the average value of estimated income accruals (i.e., excluding changes in operating receivables and liabilities) is very important and is largely negative.

In percentage terms, estimated accruals reduce the unadjusted income by 60%, bringing the average profit to 40%. On average, the most important negative value of the samples is given by depreciation and amortization (61.6%); the greatest positive value is given by the change in inventories (10.2%). As was foreseeable, the differences between the sectors of activity are marked.

To identify the accounting smoothing levers (second research question), we first determined for each company the changes in unadjusted income, accruals and net income compared to the previous year's values. This methodology allowed us to conduct a more precise analysis of accounting policies compared to the direct cross-sectional analysis carried out by many previous studies.

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The smoothing effect made by accruals on unadjusted income to obtain net income was evident, but not all accruals have the same impact. While the effect of changes in inventory is very strong, even if they exist, the effects of the other changes seem modest.

This strong correlation led us to ask ourselves (third research question) whether this inventory smoothing effect derived more from the matching principle than from the discretionary evaluation of managers.

We therefore formalized the problem by verifying that the accounting of the inventory changes required by the matching principle, in most cases, operates an "objective" smoothing effect that does not depend on the assessments. This objective smoothing is just an accounting mechanism, and it is evident that, unlike previous research, this effect should be eliminated when we analyze the discretionary choices of managers to regularize income flows.

In conclusion, this paper contributes to the ever-growing literature on accruals by proposing an approach that deepens investigation into the account mechanisms and improves the estimation of artificial smoothing to eliminate some important bias that affects previous research and, thus, makes more significant correlations possible.

The document also has important practical implications. In summary, it suggests a more critical use of models that traditionally measure artificial smoothing as the difference between operating cash flows (CFO) and net income (NI). In fact, doubts are expressed, not only on the advisability of including the variation in payment times in the determination of artificial smoothing. The paper also and above all shows that a significant part of the smoothing effect can be exclusively due to the variation in the quantities of inventory. However, in this case, we are faced with an objective smoothing effect (that is, deriving from the matching principle), which has nothing to do with the discretionary choices of managers. The strong indication for the evaluator is therefore to exclude these variations from the earning management estimate.

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ENDNOTES

1. Therefore, in detail, the "A" becomes:

$$\frac{ACC^*_{it}}{sales_{i0}} \cdot 1{,}000 = \frac{INVCH_{it}}{sales_{i0}} \cdot 1{,}000 - \frac{DPC_{it}}{sales_{i0}} \cdot 1{,}000 + \frac{CAPCST_{it}}{sales_{i0}} \cdot 1{,}000 - \frac{PRV_{it}}{sales_{i0}} \cdot 1{,}000 + \frac{AEDI_{it}}{sales_{i0}} \cdot 1{,}000 + \frac{AFA_{it}}{sales_{i0}} \cdot 1{,}000$$

APPENDICES

Appendix 1

1) $\Delta NI > 0$ (thus, $\Delta Q_S > 0$) with $P_U \neq P_S$ and

$$\Delta CFO > 0 \text{ (thus, } \Delta Q_S \cdot P_S > \Delta Q_P \cdot P_P \text{, namely, } \frac{P_S}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} with\ \Delta Q_S > 0)$$

$$\Delta NI < \Delta CFO$$

$$\Delta Q_S \cdot (P_S - P_U) < \Delta Q_S \cdot P_S - \Delta Q_P \cdot P_P$$

$$\Delta Q_S \cdot P_U > Q_P \cdot P_P$$

$$\frac{P_U}{P_P} > \frac{\Delta Q_P}{\Delta Q_S}\ with\ \Delta Q_S > 0$$

Citation Information: Cecchi, M. (2021). The accounting mechanisms behind income smoothing. *Academy of Accounting and Financial Studies Journal, 25*(6), 1-26.

Since normally $P_S > P_U$

$$\frac{P_U}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \Rightarrow \frac{P_S}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \; with \; \Delta Q_S > 0$$

$$\frac{P_U}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \Rightarrow CFO > 0 \; with \; \Delta Q_S > 0$$

2) $\Delta NI < 0$ (thus, $\Delta Q_S < 0$) with $P_U \neq P_S$ and

$\Delta CFO < 0$ (thus, $\Delta Q_S \cdot P_S < \Delta Q_P \cdot P_P$, namely, $\frac{P_S}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \; with \; \Delta Q_S < 0$)

$$\Delta NI > \Delta CFO$$

$$\Delta Q_S \cdot (P_S - P_U) > \Delta Q_S \cdot P_S - \Delta Q_P \cdot P_P$$

$$\Delta Q_S \cdot P_U < Q_P \cdot P_P$$

$$\frac{P_U}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \; with \; \Delta Q_S < 0$$

Since normally $P_S > P_U$

$$\frac{P_U}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \Rightarrow \frac{P_S}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \; with \; \Delta Q_S < 0$$

$$\frac{P_U}{P_P} > \frac{\Delta Q_P}{\Delta Q_S} \Rightarrow CFO < 0 \; with \; \Delta Q_S < 0$$

Appendix 2

$$\Delta NI = \Delta CFO + \Delta INVCH = 0$$

$$\Delta CFO = -\Delta INVCH$$

$$\Delta Q_S \cdot P_S - \Delta Q_P \cdot P_P = -\Delta Q_P \cdot P_P + (Q_S^1 \cdot P_U^{1*} - Q_S^0 \cdot P_U^0)$$

$$\Delta Q_S \cdot P_S = Q_S^1 \cdot P_U^{1*} - Q_S^0 \cdot P_U^0$$

$$\Delta Q_S \cdot P_S + Q_S^0 \cdot P_U^0 = Q_S^1 \cdot P_U^{1*}$$

$$\frac{\Delta Q_S}{Q_S^1} \cdot P_S + \frac{Q_S^0}{Q_S^1} \cdot P_U^0 = P_U^{1*}$$

$$P_U^{1*} = P_S - \frac{Q_S^0}{Q_S^1} \cdot (P_S - P_U^0)$$

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