Income Smoothing and Idiosyncratic Volatility*

Belén Gill de Albornoz Noguer.
Universitat Jaume I e IVIE

Garen Markarian.
Instituto de Empresa

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ABSTRACT

In this paper we empirically evaluate the widespread belief of managers that income smoothing results into lower stock market risk. Multivariate regressions confirm that a negative relation exists between discretionary income smoothing and idiosyncratic volatility. Further analysis indicates that smoothing is also related to analyst forecast patterns, institutional investors, share liquidity, and firm risk, all of which are independently related to volatility. Finally, we find that in cases where income smoothing appears to reduce information quality and/or otherwise lacks credibility as a signal of reduced equity risk, it is associated with higher stock return volatility, which suggests that in practice investor responses to income smoothing may be both more sophisticated and variable than previously realized.

A smooth earnings path is preferred because it is perceived as less risky by investors
(Graham et al. 2005)

1. INTRODUCTION

In their survey of 400 financial executives, Graham et al. (2005) reported that more than 96% of respondents indicated a strong preference for a smooth earnings path. The rationale behind this belief that smoothed earnings lowered investors' perception of firm-level equity risk could, ceteris paribus, be expected to reduce stock price volatility. This paper empirically evaluates this remarkably widespread belief, at least amongst managers, that investors and markets will take at face value, and favorably respond, to such discretionary financial reporting choices. Our empirical analysis centers on investigating the association between income smoothing, defined as the utilization of accounting discretion to reduce earnings variability, and the firm specific component of stock return volatility.

Previous literature on these issues is not large. A study by Lev and Kunitzky (1974) documented a positive relation between earnings variability and stock price variability, which is an important finding since both measures ought to be proxying for the same underlying firm riskiness. However, there is no prior evidence concerning the central belief that appeared to motivate the Graham et al. (2005) respondents; namely, whether income smoothing is associated with any measurable reduction in stock price volatility. Moreover, the extant literature that deals with the valuation effects of income streams (Francis et al., 2004; Core et al., 2008; McInnis, 2010), or its predictive ability (Rogers et al., 2009), provides only indirect evidence regarding the relation between income and stock price volatility. To our knowledge, this is the first empirical study to attempt a direct examination of this issue.

Consideration of why some investors may or may not find smoothed earnings series credible signals of equity risk, raises competing *a priori* hypotheses regarding the direction and strength of any relation between accounting and stock return variability measures. On the one hand, income smoothing may lower firm riskiness (see Trueman and

Titman, 1988); or, through the signaling property of smoothing, can reduce uncertainty about future profitability (Tucker and Zarowin, 2006; Dichev and Tang, 2009), which is positively related to stock return volatility (Pastor and Veronesi, 2003). Moreover, smooth income streams have a lower incidence of bad news, which is related to volatility (Rogers et al., 2009). On the other hand, Jayaraman (2008) contends that smoothing reduces firm level information (garbling), which is positively related to volatility, while Rajgopal and Venkatachalam (2011) (thereafter RV) argue that lower earnings quality results into higher share price volatility. Clearly, there is a distinct tension in the literature in regard to investor reactions to discretionary smoothing of earnings streams that our empirical analysis described below attempts to resolve.

Using a sample of approximately 118,000 firm-year observations over a 50 year period, both univariate and multivariate analyses indicate that income smoothing is negatively related to idiosyncratic volatility, while controlling for a large number of covariates and alternate estimation techniques. Additional analysis shows that smoothing is related to intermediary factors that are known to affect volatility, such as the properties of analyst forecasts, institutional ownership and trading, the liquidity and trading of stock, and firm riskiness. Further analysis reveals that there is a nuanced response to income smoothing, such as when conducted in poorly performing firms, where discretionary choices are suspected of being utilized primarily to mask underlying poor performance, there is a positive relation between smoothing and volatility. Furthermore, analysis on the subsample of firms where a smoother earnings stream is observed indicates that when smoothing is highly visible (e.g. smoothing is done through special items), or excessive (e.g. when the magnitude of accruals is large enough to reverse the direction of the change in unmanaged earnings), smoothing also leads to higher volatility.

These results suggest that, whilst income smoothing tends to reduce stock return volatility on average, investors exhibit differential responses to discretionary reporting choices. Indeed, we find that in cases where income smoothing appears to reduce information quality and/or otherwise lacks credibility as a signal of reduced equity risk, it is associated with higher stock return volatility, which indicates that in practice investor responses to income smoothing may be both more sophisticated and variable than previously realized.

Our work is a direct extension of RV, who examine the relation between several proxies of earnings quality and idiosyncratic risk. Our analysis extends RV by examining smoothing, which is a special case of earnings management. We first show that our results are incremental to theirs, but moreover, we show that smoothing has different

(and often contrary) market related consequences as compared to standard measures of earnings quality. Hence, we document that one aspect of earnings management, income smoothing, reverses RVs' findings. The apparent contradictory findings of this paper with those of RV are consistent with the Dechow et al. (2010) claim for the uniqueness of the different earnings quality proxies used in the literature. As pointed out by Dechow et al. (2010, p.6): «the properties of earnings that are often used as proxies for earnings quality are not substitute measures for the decision usefulness of a firm´s earnings.» As such, a corollary of our findings, in conjunction with RV's, is that income smoothing is perceived to be, on average, higher earnings quality.

This paper makes a number of contributions to the existing literature. This paper contributes to the survey evidence obtained by Graham et al. (2005), where managers overwhelmingly indicate that they are prepared to take costly action in order to reduce investors' perceptions of risk. Our results are, to a significant degree, consistent with managers' beliefs that income smoothing reduces stock return volatility, even though from a valuation perspective smoothing is found to be unrelated to firm value (McInnis, 2010; Rountree et al., 2008). As such, our results identify a prime reason as to why managers smooth although it might not be related to firm valuation, since smoothing reduces idiosyncratic risk, which in turn is related to job security (Bushman et al., 2010).

This study also has relevance for the literature on the informational role of accounting numbers. Volatility is partly a function of uncertainty regarding future profitability (Pastor and Veronesi, 2003). Consequently income smoothing seems to convey information in relation to firm-level uncertainty. From a market consequences perspective, investors care about idiosyncratic volatility only if it affects share returns. There is significant debate in the literature on whether idiosyncratic volatility is priced or not (Goyal and Santa Clara, 2003; Guo and Savickas, 2008). Our study provides a rationale and evidence for a relation between financial reporting and returns, through the role of idiosyncratic volatility. In fact, if idiosyncratic volatility is priced, our results suggest that financial (mis)reporting can lead to (at least temporary) mispricing.

The rest of the paper is structured as follows. The next section discusses the prior literature and presents our research question. Section 3 details the measurement of the variables, the sample selection, descriptives, and univariate results. Section 4 contains the results of our main multivariate tests. Section 5 analyzes the mechanisms through which smoothing could affect volatility. Section 6 examines situations where smoothing leads to increases in volatility. Section 7 presents robustness and additional untabulated tests. Finally, section 8 provides concluding comments.

2. LITERATURE REVIEW AND RESEARCH QUESTION

2.1. Income smoothing and idiosyncratic volatility

Income smoothing is the utilization of accounting discretion to reduce income stream variability (Fudenberg and Tirole, 1995). Smoothing moderates year-to-year fluctuations in income by shifting earnings from peak years to less successful ones, making earnings fluctuations less volatile (Copeland, 1968). *Idiosyncratic volatility* is the component of share price volatility that is independent of market-wide fluctuations, and therefore related to firm-level characteristics. A large body of evidence both from academics and practitioners alike suggests that these two are related.

In the field study carried out by Graham et al. (2005), there was a remarkably strong endorsement of one of the assumed motivations for income smoothing, since about 97% of respondents indicated that they preferred to report a smoothed earnings path, because this was expected to lower investors' beliefs regarding firm-level risks, and would therefore be expected to be associated with lower stock return volatility. A large number of studies have indeed suggested the existence of incentives to reduce the volatility of both stock price and earnings. Stock price volatility has been associated with an increased cost of capital (Beaver et al., 1970; Gebhardt et al., 2001), while earnings volatility has been linked to the valuation of firms, often with conflicting findings (Dye, 1988; Rountree et al. 2008; McInnis, 2010). More recent evidence suggests that idiosyncratic volatility has been increasing over last decades (Campbell et al., 2001), partly due to deteriorating earnings quality (Rajgopal and Venkatachalam, 2011), with important implications for portfolio diversification, corporate incentive systems, and CEO behavior.

2.2. Research question

Given managers' and investors' preference for smooth earnings/stock price streams, a number of avenues could affect the income smoothing-idiosyncratic volatility relation.[1] As discussed below, the relation between income smoothing and volatility is not clear *a priori*. On the one hand, prior research suggests that income smoothing lowers operational risk, staving off bankruptcy and lowering the cost of debt (Trueman and Titman,

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[1] Alternatively, rather than smooth income, managers may affect real operating performance to temper risk, which some studies claim to be more costly (e.g., Cohen and Zarowin, 2008). We do not address this issue, since we focus on accounting based income smoothing.

1988); hence, it has a real economic effect. Additionally, risk increases costs on various stakeholders who need to be compensated (Miller and Chen, 2003). Moreover, income smoothing could be related to idiosyncratic volatility through the informational properties of accounting earnings. Prior research shows that income smoothing succeeds in conveying information about future profitability (Turcker and Zarowin, 2006; Dichev and Tang, 2009), and Pastor and Veronesi (2003) argue that there is a positive relation between stock return volatility and uncertainty about future profitability. Also, smooth income streams, by construction, are associated with a lower incidence of bad news, which is related to volatility (Rogers et al., 2009). Overall, this stream of research suggests a negative relation between income smoothing and volatility.

On the other hand, income smoothing can be positively related to volatility because it has been linked to increased firm opaqueness. Income smoothing is viewed as a mechanism that garbles information. Jayaraman (2008) concludes that earnings that are less volatile than cash flows garble information. Similarly, Leuz et al. (2003) argue that in economies with less enforcement and more private benefits of control, companies smooth income to conceal private information. RV argue that to the extent that reported income numbers do not reflect underlying operational activities, a lack of transparency induces a larger dispersion of beliefs regarding firm prospects, hence, a larger weight on idiosyncratic private earnings signals, and a resulting higher share price volatility. Consistent with such an argument, RV find a strong association between rising idiosyncratic volatility and falling earnings quality measures obtained from the Dechow and Dichev (2002) model and the modified Jones abnormal accruals model (Dechow et al., 1995). Assuming that investors can observe the garbling of accounting numbers, an implication of these findings is that income smoothing, being a special case of earnings management (Tucker and Zarowin, 2006), should be positively related to idiosyncratic volatility.

Our subsequent analysis attempts to examine the relation between smoothing and idiosyncratic volatility, keeping in mind that *ex-ante* predictions are to a degree contingent upon other firm-level factors which can lead to either or both a positive or negative relation between these two variables. Moreover, we try to understand the effects of smoothing on several capital markets related factors, which in turn are related to idiosyncratic volatility. This enables us to better understand the nature and mechanism of the smoothing-volatility relation.

3. SAMPLE, VARIABLE MEASUREMENT, DESCRIPTIVE STATISTICS, AND UNIVARIATE RESULTS

3.1. Sample

We utilize *CRSP* daily data to calculate idiosyncratic volatility, and *Compustat* to calculate our income smoothing and control variables. Similar to RV, our data starts in 1962, and ends in 2011, the last year of data available. After eliminating financials and utilities, the cross-section of *Compustat* and *CRSP* gives us 118,015 firm-year observations with complete data for the main multivariate analysis. For robustness and other auxiliary tests, the data selection procedures are explained in their respective sections.

3.2. Measurement of variables

3.2.1. Idiosyncratic volatility

Our idiosyncratic volatility variable (*Volat*) is calculated following RV, as the average monthly variance of market adjusted returns. This is computed by taking the excess of daily stock returns over the daily return on the value weighted market portfolio. This computation is consistent with the market adjustment procedure of Campbell et al. (2001).

3.2.2. Income smoothing

We calculate income smoothing according to Tucker and Zarowin (2006), as the correlation of the change in discretionary accruals with the change in pre-discretionary earnings (i.e. between managed and unmanaged earnings), where a more negative correlation indicates higher smoothing levels. We multiply this variable by -1, to obtain a variable that is increasing in smoothing (*Corr*). We measure discretionary accounting decisions through the modified Jones model (Dechow et al., 1995).[2,3] Since we cannot

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[2] Basically, discretionary accruals are calculated as total accruals minus non-discretionary accruals (accruals that are related to sales growth, receivables, and *PPE*). The calculation is done for each firm on a yearly basis, adjusting for Fama-French industrial membership.

[3] Discretionary accruals can be calculated in a variety of ways, it is not our intention to suggest a preferred measure. In robustness tests we calculate discretionary accruals in alternate specifications with similar results.

observe managerial income smoothing actions, this measure has the advantage that it partitions accruals into an innate (i.e., non-discretionary) and a discretionary component. The estimated discretionary accrual component is assumed to proxy for active managerial decisions to smooth the underlying «unsmoothed» earnings series.

One potential issue regarding the measurement of our relations is time-consistent matching of our research variables. Given that income smoothing is performed over multiple time periods, and it manifests over a long cycle, the effects on the market should be observed after a time lag. From this perspective, reductions in idiosyncratic volatility follow observable income streams. Therefore, in our empirical research design, we measure income smoothing over a three year period, using current and past data, and match it to one year ahead idiosyncratic volatility.

3.2.2. Control variables

We employ a number of controls in our statistical tests, based on variables identified in prior literature as related either to income smoothing or to stock price volatility. *LogAssets* denotes the logarithm of the book value of assets, used as a control for visibility and information asymmetry. Return on assets, *ROA,* is used as a control for profitability, calculated as net income before extraordinary items divided by total assets. The level of debt is proxied by *Leverage*, calculated as long term debt over total assets. We control for a firm's investment opportunity set and growth opportunities by calculating *MB*, which is the market value of equity divided by its book value. *DevCFO* is the standard deviation of cash flows, calculated using yearly data over a period of 3 years. We also employ dummy variables for industry, classified into 48 industries according to Fama and French (1997), since managers with similar risk preferences and utility functions self-select into similar industries (Lambert et al., 1991), and risk varies across industries. Finally, we also control for year effects using dummies. All variables are winsorized at 1% at both ends. Other variables used in the robustness tests and additional analyses are discussed in the respective sections.

3.3. Descriptive statistics

Table 1 presents the descriptive statistics. *Volat* has a mean of 0.039 and a median of 0.018, similar to RV, whose estimation methodology we copy. Mean *Corr* is 0.672 (median = 0.952), indicating that there is a high negative correlation between change

in discretionary accruals and change in pre-managed earnings. Both the mean and median of our income smoothing variable compare well with Tucker and Zarowin (2006), who report a mean (median) of 0.71 (0.90). *Assets* has a mean of about $1,101 million with a median of about $109 million; this figure is right skewed because of the large asset base of the largest firms, and reflects the large dispersion characterizing our long time series. *ROA* has a mean (median) of -0.004 (0.043), *MB* has a mean (median) value of 2.417 (1.553), and *Leverage* is 0.196 (0.169). Our descriptives are similar to those of RV.

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TABLE 1.
DESCRIPTIVE STATISTICS (118,015 FIRM-YEAR OBSERVATIONS DURING 1962-2011)

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This table reports descriptive statistics for the variables included in model (1) of Table 3. The sample comprises more than 14,946 individual firms. *Volat* is one year ahead idiosyncratic volatility, estimated as the average of the monthly variance of daily market adjusted returns. *Corr* is the inverted sign of the correlation between the change in pre-managed earnings and the change in discretionary accruals, calculated over a three-year period. *Assets* is the book value of total assets (million $). *ROA* is net income before extraordinary items divided by total assets. *MB* is the market value of equity divided by its book value. *Leverage* is long term debt over total assets. *DevCFO* is the standard deviation of cash flow from operations, calculated using yearly data over a period of 3 years. All variables are winsorized at 1% and 99%.

Variable	Mean	p50	St.Dev.	p5	p25	p75	p95
Volat	0.039	0.018	0.061	0.004	0.009	0.041	0.149
Corr	0.672	0.952	0.553	-0.808	0.657	0.994	1.000
Assets	1,100.6	108.6	3,418.5	6.1	29.4	496.9	5,198.0
ROA	-0.004	0.043	0.195	-0.355	-0.003	0.080	0.150
MB	2.417	1.553	3.391	0.342	0.887	2.773	7.568
Leverage	0.196	0.169	0.179	0.000	0.029	0.306	0.535
DevCFO	0.107	0.052	0.277	0.010	0.027	0.098	0.280

3.4. Correlations and univariate analyses

As an initial indication, we present correlations in Table 2 (Pearson/Spearman pairwise correlations are shown above/below the diagonal), which provide preliminary and univariate evidence. One year ahead *Volat* is negatively correlated to *Corr* ($\rho_{Spearman}$ = -0.23, $p < 0.01$): higher levels of income smoothing are related to lower idiosyncratic volatility. In contrast, volatility is positively related to *DevCFO* ($\rho_{Spearman}$ = 0.33, $p < 0.01$), indicating that it is (partly) a manifestation of underlying operational risk. Income smooth-

ing is weakly and positively related to firm size, strongly related to profitability, and positive to leverage, while inconclusively related to the deviation of cash flows.[4] On the other hand, smoothing is negatively related to the market-to-book ratio. In turn, idiosyncratic volatility is negatively related to firm size (*LogAssets*), profitability (*ROA*), and leverage (*Leverage*), but non-conclusively related to *MB*.

To provide a visual representation of the relation between idiosyncratic volatility and income smoothing, we plot the mean value of one year ahead idiosyncratic volatility by deciles of income smoothing. As shown in Figure 1, a monotonic negative relation is observed. The mean of one year ahead *Volat* in the lowest and highest deciles of *Corr* is 0.061 and 0.026 respectively, the difference being statistically significant at the 1% level (*t*-statistic = 41.67).

TABLE 2.
CORRELATIONS

This table shows Pearson (above diagonal) and Spearman (below diagonal) pairwise correlations among our main research variables for our sample of 118,015 observations. *Volat* is one year ahead idiosyncratic volatility, estimated as the average of the monthly variance of daily market adjusted returns. *Corr* is the inverted sign of the correlation between the change in pre-managed earnings and the change in discretionary accruals, calculated over a three-year period. *LogAssets* is the logarithm of total assets. *ROA* is net income before extraordinary items divided by total assets. *MB* is the market value of equity divided by its book value. *Leverage* is long term debt over total assets. *DevCFO* is the standard deviation of cash flow from operations, calculated using yearly data over a period of 3 years. All variables are winsorized at 1% and 99%. Levels of significance are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1.

	Volat	Corr	LogAssets	ROA	MB	Leverage	DevCFO
Volat	**1.00**	-0.17***	-0.35***	-0.43***	0.03***	-0.02***	0.08***
Corr	-0.23***	**1.00**	0.03***	0.26***	-0.11***	0.07***	-0.01***
LogAssets	-0.52***	0.02***	**1.00**	0.25***	-0.02***	0.10***	-0.23***
ROA	-0.45***	0.23***	0.19***	**1.00**	-0.14***	-0.01***	-0.16***
MB	-0.07***	-0.11***	0.12***	0.24***	**1.00**	-0.10***	0.06***
Leverage	-0.07***	0.12***	0.15***	-0.16***	-0.20***	**1.00**	4.8×10^{-3}*
DevCFO	0.33***	0.06***	-0.43***	-0.18***	-0.02***	-0.09***	**1.00**

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[4] Spearman rank correlations indicate results contrary to Pearson correlations, indicating possible non-linearities.

FIGURE 1.
IDIOSYNCRATIC VOLATILITY BY DECILES OF INCOME SMOOTHING

The graph plots the mean value of one year ahead idiosyncratic volatility (*Volat*) by deciles of income smoothing (*Corr*).
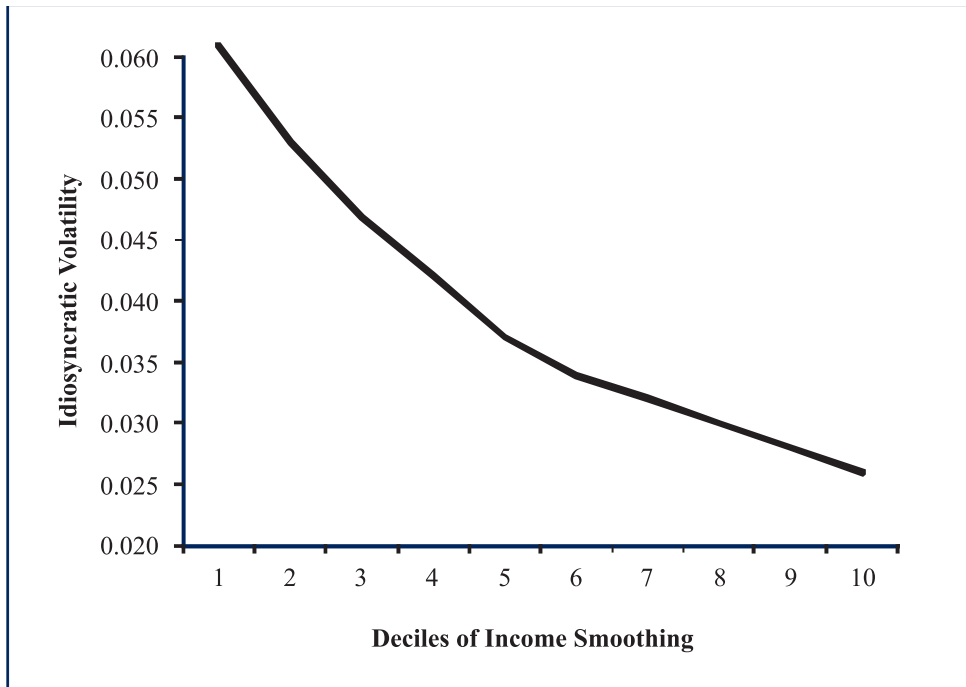

Next, to provide further univariate evidence, we analyze the monthly idiosyncratic volatility of firms that smooth ($Corr_t - Corr_{t-1} > 0$) versus those that do not. We look at a cycle of 24 months, and separate our firms into two groups: smoothers (non-smoothers) are those that increase (decrease) *Corr* in two consecutive fiscal years. Results are shown in Figure 2.

FIGURE 2
EVOLUTION OF MONTHLY IDIOSYNCRATIC VOLATILITY BEFORE THE EARNINGS ANNOUNCEMENT DATE FOR SMOOTHING AND NON-SMOOTHING FIRMS

This graph plots the evolution of the mean value of the monthly idiosyncratic volatility over a two year period. Dashed (solid) line depicts smoother (non-smoother) firms, defined as those who increased (decreased) *Corr* for two consecutive periods. The month of the first (second) earnings announcement date is denoted by *t-12* (*t*).
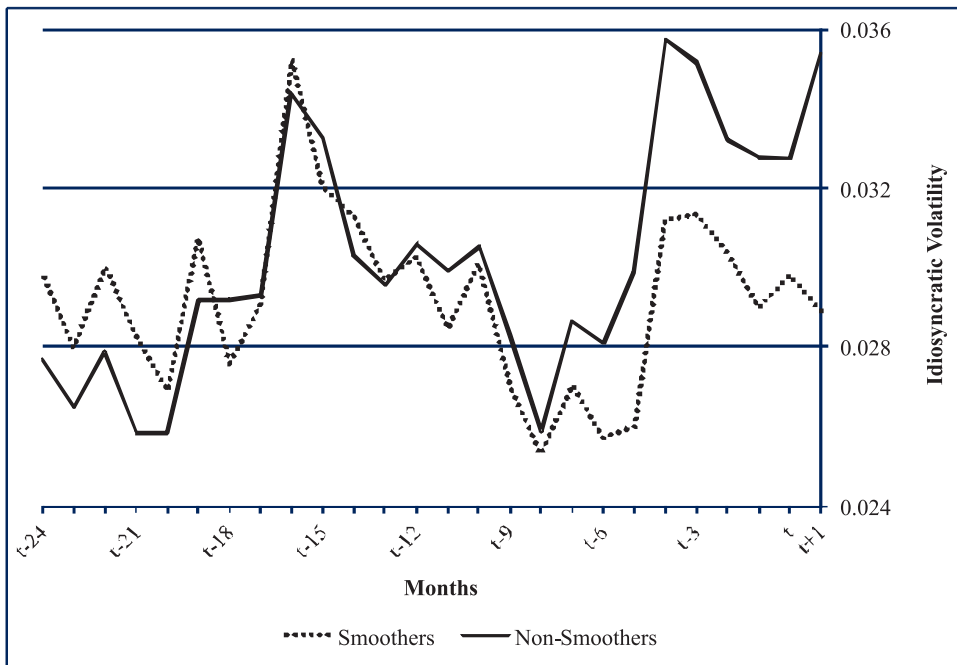
We can see that at the beginning of the cycle, smoothers have on average significantly higher idiosyncratic volatility (0.0298 vs. 0.0277, *t*-statistic = -1.99, p < 0.05). This difference persists until two quarters before the first earnings announcement ($t – 12$), where smoother firms' volatility becomes almost equal to that of the non smoothers. After the first earnings announcement, the pattern of idiosyncratic volatility among the two groups starts to diverge, up until the year 2 earnings announcement (time = t). One month after the year 2 earnings announcement date the mean idiosyncratic volatility of the smoother group is markedly lower than that of the non-smoothers (0.0289 vs. 0.0354, *t*-statistic = 1.80, p < 0.10).

However, it is difficult to draw strong inferences at the univariate level, since the correlation matrix (Table 2) indicates that there are high correlations among the variables: both firm size and profitability are highly correlated with both one year ahead *Volat* and *Corr*. To go beyond the statistical limitations of univariate analysis, we now turn our attention to multivariate regressions.

## 4. MULTIVARIATE TESTS

4.1. Research design

We present the relation between income smoothing and firm level idiosyncratic volatility in the following statistical formulation, where coefficients are omitted for simplicity.

$$Volat_{i,t+1} = Corr_{it} + ROA_{it} + MB_{it} + LogAsssets_{it} + Leverage_{it} + DevCFO_{it}$$
$$+ \ Industry \ Controls_{it} + Year \ Controls_{it} \tag{1}$$

We estimate equation (1) by Ordinary Least Squares (OLS), correcting the standard errors for correlation across observations of a given firm and across observations of a given year by clustering on both firm and year, following the methodology suggested by Thompson (2009) and by Cameron et al. (2011). For a timeline of our variables see Figure 3.

FIGURE 3.
TIMELINE OF VARIABLES

The graph illustrates the time matching of our research variables. *Corr* refers to income smoothing, *Volat* refers to idiosyncratic volatility, and *Controls* refer to the control variables utilized in our empirical models. In order to keep the calculation of income smoothing and volatility separate, *Corr*, which is calculated over the time period *t-3* to *t*, is matched with one year ahead volatility (calculated over time period *t* to *t+1*). *Controls* are also measured at time *t*.
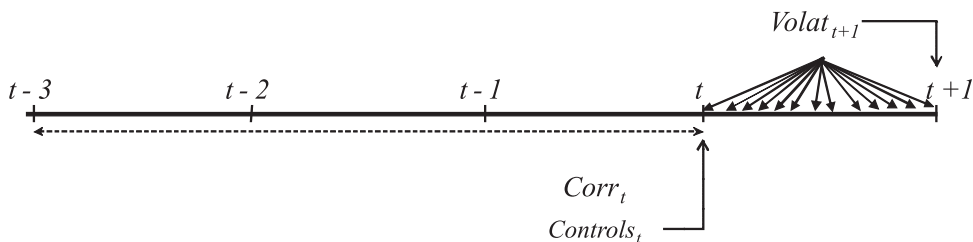
4.2. Main tests on the relation between smoothing and volatility

Table 3 presents our main findings. Model (1) presents our baseline OLS regression, specified in equation (1) above. Consistent with our univariate findings, we find that after controlling for firm size, profitability, growth opportunities, leverage, deviation of cash flows, and year and industry effects, *Corr* is still negative to one year ahead *Volat* and statistically significant (*t*-statistic = -4.94).

Results for the control variables are consistent with prior literature: *LogAssets* is negatively related to *Volat*, which indicates that larger firms have lower levels of idiosyncratic risk; the same can be said in regard to firm profitability (*ROA*), which again is as expected; *MB* is negatively related to *Volat*, indicating that controlling for size and profitability, firms with more growth opportunities are less risky (see Petkova and Zhang, 2005, for an analysis of the riskiness of growth firms). *Leverage* is positive to idiosyncratic volatility, indicating that firms with higher levels of debt have higher share price volatility. Finally, *DevCFO* is not significantly related to volatility. *R*-squared is 35.4%, indicating reasonable fit.

TABLE 3.
RELATION BETWEEN INCOME SMOOTHING AND IDIOSYNCRATIC VOLATILITY

Model (1) shows the coefficients from the OLS regression of one year ahead idiosyncratic volatility (*Volat)* on income smoothing (*Corr*) and control variables (*LogAssets, ROA, MB, Leverage* and *DevCFO*). All variables are winsorized at 1% and 99%. Model (2) shows the coefficients from the second equation of a three-stage least squares regression where the second equation is *Volat* = *Corr* + *Controls*, and the first equation is *Corr* = lagged *Volat* + lagged *Controls*, where all independent variables are lagged by four years to precede the time period related to the measurement of smoothing. Model (3) shows the results of the OLS regression of changes in idiosyncratic volatility (*Ch_Volat*) on changes in income smoothing and control variables. In this model each independent variable *X* represents changes in the corresponding variable, where changes are calculated from *t-3* to *t* to precede the time period related to the measurement of change in idiosyncratic volatility. Finally, models (4) and (5) include the earnings quality measures used by Rajgopal and Venkatachalam (2011) as additional regressors: *ABACC²*, is the squared term of abnormal accruals calculated using the modified Jones model (Dechow et al., 1995); and *DD* is calculated from the Dechow and Dichev (2002) model. We report *t*-statistics adjusted for clustering on both firm and year. Levels of significance are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1.

	Model 1 $Volat_{t+1}$	Model 2 $Volat_{t+1}$	Model 3 Ch_Volat_{t+1}	Model 4 $Volat_{t+1}$	Model 5 $Volat_{t+1}$
Constant	0.0510***	0.3440***	0.0074***	0.0510***	0.0557
	[6.12]	[2.81]	[3.38]	[6.11]	[0.00]
Corr	-0.0022***	-0.3494***	-0.0063***	-0.0022***	-0.0023***
	[-4.94]	[-50.06]	[-2.13]	[-4.96]	[-4.83]
LogAssets	-0.0096***	-0.0049***	-0.0134***	-0.0096***	-0.0084***
	[-11.23]	[-18.48]	[-7.78]	[-11.22]	[-10.51]
ROA	-0.1002***	-0.0223***	-0.0537***	-0.0989***	-0.0904***
	[-15.22]	[-5.62]	[-14.17]	[-15.29]	[-13.78]
MB	-0.0010***	-0.0015***	-0.0007***	-0.0011***	-0.0011***
	[-6.41]	[-23.79]	[-6.11]	[-6.47]	[-6.67]
Leverage	0.0175***	0.0109***	0.0145***	0.0175***	0.0162***
	[5.80]	[9.94]	[4.61]	[5.83]	[5.69]
DevCFO	0.0039	0.0296***	0.0078**	0.0028	-0.0102***
	[0.75]	[13.60]	[2.10]	[0.55]	[-3.20]
ABACC²				0.0118**	
				[2.21]	
DD					0.1373***
					[13.60]
Year Dummies	Yes	Yes	Yes	Yes	Yes
Ind. Dummies	Yes	Yes	Yes	Yes	Yes
Observations	118,015	90,353	84,650	118,015	98,825
R-squared	35.4%		16.8%	35.4%	35.6%

It can be argued that income smoothing is itself an endogenous function of firm-level risk: a manager observes a high level of operational volatility, and consequently smoothes income. To control for this potential endogeneity problem in the association between income smoothing and idiosyncratic risk, we use a three-stage least squares methodology to estimate the following system of equations:

$$Corr_{it} = Volat_{i,t-4} + MB_{i,t-4} + LogAssets_{i,t-4}$$
$$+ \; Industry \; Controls_{i,t-4} + Year \; Controls_{i,t-4} \tag{2}$$

$$Volat_{i,t+1} = Corr_{it} + ROA_{it} + MB_{it} + LogAssets_{it} + Leverage_{it} + DevCFO_{it}$$
$$+ \; Industry \; Controls_{it} + Year \; Controls_{it} \tag{3}$$

The first level equation (equation 2) measures the amount of income smoothing carried out, given a past level of idiosyncratic volatility.[5] The second level equation (equation 3), in turn, measures the subsequent effect of smoothing on idiosyncratic volatility. The second stage regression results of the 3SLS estimation are tabulated in model (2) of Table 3. *Corr* is negatively related to one year ahead *Volat* (*t*-statistic = -50.06), confirming our previous findings. Therefore, when we control for the endogenous relation between income smoothing and idiosyncratic volatility, we also find that smoothing negatively affects volatility.

Next, we perform a changes analysis among our variables. If income smoothing has a negative effect on idiosyncratic volatility, we should also observe a link between changes in income smoothing patterns and idiosyncratic volatility. If a CEO's income smoothing decisions have a significant influence on idiosyncratic volatility as our results have implied so far, then as income smoothing changes over time, we would expect to see a corresponding change in volatility. For all variables in model (1) of Table 3, including both the dependent variable and the regressors, we calculate changes by taking the difference with three-year lagged values. In other words, changes in variable X in year t (Ch_X_t) are calculated as the difference between the variable in year t and the variable in year *t-3* ($X_t - X_{t-3}$). Results, presented in model (3) of Table 3, indicate that changes in our income smoothing variable are also negatively and significantly related to changes in idiosyncratic volatility.

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[5] Using the standard deviation of cash flows instead of idiosyncratic volatility yields qualitatively similar results.

Regarding the economic significance of our multivariate findings, the effect varies depending on the econometric model used. For the basic OLS estimation tabulated in model (1), a one standard deviation increase in income smoothing results in a decrease in idiosyncratic volatility of 0.2%.[6] However, for the system of equations in model (2), the economic effect is in stark contrast to the modest results obtained in model (1): a one standard deviation increase in smoothing can result in a decrease in volatility of up to 19.2%.[7] We can see a large variation in the economic effects depending on the statistical model used. Although correct inferences are obtained when using the correct *a priori* theoretical model, we do not take a position on the efficiency of our models, and present results using OLS, three-stage least squares, and a changes analysis.

4.3. Controls for Rajgopal and Venkatachalam's (2011) earnings quality proxies

If income smoothing results in and/or is construed by investors as lowering earnings quality, our findings may be interpreted as being inconsistent with those of RV, who find that idiosyncratic volatility has been increasing through time, and that the observed increase in idiosyncratic volatility over the period 1962-2001 is related to a decline in earnings quality.

To build upon RV's findings, we re-run our main model controlling for their earnings quality proxies: the Dechow and Dichev (2002) measure of accruals quality (*DD*); and the squared value of discretionary accruals (*ABACC²*) calculated *ala* modified Jones (Dechow et al., 1995). Consistent with RV's results, we find that both *DD* and *ABACC²* are positive to one year ahead *Volat* (models 4 and 5 in Table 3). These results, cumulatively, indicate that lower earnings quality is related to higher idiosyncratic volatility. More importantly, income smoothing (*Corr*) is still negative and significant. This could indicate that, as suggested by Dechow et al. (2010), the alternate proxies for earnings quality are potentially measuring different underlying constructs. Following this line of reasoning, our results may suggest that in investors' decision models, the earnings quality construct underlying smoothing is orthogonal to the one underlying the earnings quality measures of RV and, as a consequence, has the opposite effect on volatility. This point is further examined in the following section.

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[6] Economic significance for model (1) is calculated as 0.0022 * 0.952 = 0.2%, where 0.952 is the standard deviation of *Corr* in the sample where model (1) has been estimated.

[7] The economic significance for model (2) is calculated as 0.3494 * 0.549 = 19.2%, where 0.549 is the standard deviation of *Corr* in the sample where model (2) is estimated.

5. THE MECHANISMS UNDERLYING THE SMOOTHING TO VOLATILITY RELATION

In this section we try to further understand the link between smoothing and volatility that our prior analyses have indicated. We examine the consequences of smoothing that can also have an effect on idiosyncratic volatility, shedding light on the underlying mechanism. Results are reported in Table 4. We look at the relation between smoothing and: the properties of analyst forecasts (Panel A); institutional investor ownership and trading (Panel B); stock price liquidity and trading (Panel C); and firm riskiness (Panel D). In order to examine the conceptual distinctiveness of our analysis as compared to RV, we also examine how $ABACC^2$ is related to these variables. We only tabulate coefficients and t-statistics of $Corr$ and $ABACC^2$. All models include the full set of control variables as per model (1) of Table 3, as well as year and industry controls.

TABLE 4.
CONSEQUENCES OF SMOOTHING

This table presents the one year ahead market related consequences of income smoothing (*Corr*), and the squared term of abnormal accruals (*ABACC²*). Models shown in Panel A include as dependent variables: the standard deviation of the revision in analysts' forecasts (*Deviation_Forecasts*), the absolute value of earnings surprises (*AbsSurprise*), calculated as actual earnings minus consensus analyst forecasts normalized by share prices; and the dispersion in analysts' forecasts (*Dispersion*). Dependent variables of models included in Panel B are: the percentage of ownership held by institutional investors (*Institution*); the intensity of institutional trading (*Institution_Trading*); and the percentage of shareholdings by transient institutions (*Transient*). Dependent variables in Panel C include: share turnover, measured as shares traded during the year divided by total shares outstanding (*Turnover*); and the number of trades during the year (*Trades*). Finally, dependent variables included in Panel D are: the Hillegeist et al. (2004) estimates of the actual/risk-neutral probability of bankruptcy (*Bankruptcy1/ Bankruptcy2*); and a dummy variable that equals 1 for the lowest quintile of the change in *ROA* (*LargeDecreaseROA*). For the sake of brevity, we only report the coefficients and *t*-statistics of *Corr* and *ABACC²*. Models (1) to (20) show the results of OLS regressions, while models (21) and (22) show the results of logistic regressions. All models include the full set of controls included in our main model (*LogAssets*, *ROA, MB, Leverage* and *DevCFO*), and industry and year dummies. Models (1) to (6) and (9) to (12) also control for institutional holdings. Models (15) and (16) also control for the absolute value of stock returns. All variables are winsorized at 1% and 99%. In OLS regressions we report *t*-statistics adjusted for clustering on both firm and year. In logistic regressions we report *z*-statistics that are robust to heteroskedasticity and firm level clustering. Levels of significance are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1.

Panel A: Sell-Side Analysts						
	Deviation_Forecasts$_{t+1}$		AbsSurprise$_{t+1}$		Dispersion $_{t+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Corr	-0.0058***	-0.0058***	-0.0016***	-0.0016***	-0.0008***	-0.0008***
	[-4.15]	[-4.14]	[-2.66]	[-2.67]	[-2.80]	[-2.79]
ABACC²		0.0014		0.0066		-0.0023
		[0.07]		[0.62]		[-0.53]
Observations	37,601	37,601	39,744	39,744	32,689	32,689
R-squared	9.74%	9.74%	9.23%	9.24%	12.58%	12.59%

TABLE 4 (CONTINUES).

	Panel B: Institutional Investor Holding and Trading					
	$Institution_{t+1}$		$Institution\_Trading_{t+1}$		$Transient_{t+1}$	
	(7)	(8)	(9)	(10)	(11)	(12)
Corr	0.3659*	0.3635*	0.0506***	0.0502***	-0.6377***	-0.6360***
	[1.77]	[1.75]	[3.56]	[3.57]	[-5.49]	[-5.48]
$ABACC^2$		-7.0950***		-0.4467***		1.9547***
		[-4.66]		[-4.78]		[3.22]
Observations	78,865	78,865	45,654	45,654	44,357	44,357
R-squared	42.15%	42.18%	41.82%	41.87%	38.93%	38.94%

	Panel C: Share turnover and Number of Trades			
	$Turnover_{t+1}$		$Trades_{t+1}$	
	(13)	(14)	(15)	(16)
Corr	-0.1173***	-0.1172***	-0.0010***	-0.0010***
	[-8.71]	[-8.90]	[-2.96]	[-2.92]
$ABACC^2$		0.7693***		0.0085***
		[7.20]		[4.84]
Observations	106,859	106,859	26,485	26,485
R-squared	30.60%	30.77%	36.03%	36.11%

	Panel D: Firm Risk					
	$Bankruptcy1_{t+1}$		$Bankruptcy2_{t+1}$		$LargeDecreaseROA_{t+1}$	
	(17)	(18)	(19)	(20)	(21)	(22)
Corr	-0.0092***	-0.0093***	-0.0116***	-0.0117***	-0.2953***	-0.2915***
	[-3.92]	[-3.92]	[-4.85]	[-4.84]	[-15.92]	[-15.68]
$ABACC^2$		0.0507*		0.0594*		0.5604***
		[1.92]		[1.92]		[4.29]
Observations	64,870	64,870	64,870	64,870	106,679	106,679
R-squared	25.43%	25.44%	29.12%	29.14%	12.40%	12.43%

5.1. Smoothing and the properties of analyst forecasts

In Panel A of Table 4, we examine the relation between income smoothing and the one year ahead standard deviation of revisions in analyst forecasts (*Deviation_Forecasts*), one year ahead absolute earnings surprises (*AbsSurprise*), and one year ahead dispersion in analyst forecasts (*Dispersion*). Both revisions in forecasts and earnings surprises have been shown to move prices (Stickel, 1991; Ball and Shivakumar, 2008), hence lower magnitudes of those relate to lower share price volatility. As for analyst forecast dispersion, RV argue for a positive relation between earnings quality and idiosyncratic volatility, since a lack of transparency induces a larger dispersion of beliefs regarding firm prospects.

Analyst data is drawn from the I/B/E/S summary files over the period 1985-2010. In model (1) of Panel A, we examine the relation between smoothing and the one year ahead standard deviation of revisions in analyst forecasts, *Deviation_Forecasts*, calculated over a 12 month period with at least 10 months of data. Results show that *Corr* is negatively related to one year ahead *Deviation_Forecasts* (*t*-statistic = -4.15). In model (3) we provide evidence that smoothing results into lower one year ahead absolute earnings surprises (*t*-statistic = -2.66), calculated as actual earnings minus the last consensus analyst forecast normalized by share prices. In model (5), results indicate that smoothing is negative to one year ahead dispersion in analyst forecasts (*t*-statistic = -2.80). When we re-run the same regressions with $ABACC^2$ as an additional regressor (models 2, 4, and 6 in Panel A), we find that $ABACC^2$ is non-significant in all models. Unreported results indicate that when including *DD* instead of $ABACC^2$ in models 2, 4 and 6 *DD* is positive and significant to all the three one year ahead analyst related characteristics, hence has the opposite consequence as that of smoothing.

5.2. Smoothing and institutional ownership and trading

Several studies argue that both institutional holding and institutional trading are associated with lower stock price volatility (Reilly and Wachovicz, 1979; Lakonishok et al., 1992). In a similar vein, Sias and Starks (1997) find that institutional trading reflects information, and speeds price adjustment, hence, implying less price deviations from fundamentals, and a lower level of volatility induced by noise traders. In contrast, Bushee and Noe (2000) argue that one particular type of institutional investors, transient investors, which are characterized by aggressive trading based on short term strategies, are associated with higher stock price volatility.

Institutional ownership data is obtained from Thomson Reuters. Models (7), (9) and (11) in Panel B of Table 4 show the results of the OLS models where the three institution related variables are regressed on *Corr*. Model (7) shows that income smoothing is positively related to one year ahead institutional holding (*Institution*, *t*-statistic = 1.77, p < 0.10). In model (9), we calculate a measure of institutional trading according to Ferreira and Laux (2007), using quarterly changes in individual institutional holdings divided by total shares outstanding, and we see that it increases with smoothing (*Institution_Trading*, *t*-statistic = 3.56). Finally, in model (11) we utilize the institutional classifications according to investment style and holdings as in Bushee (1998), to calculate a measure of transient institutional holding (*Transient*), and we see that it is negatively related to smoothing (*t*-statistic = -5.49). When we re-run the same regressions including $ABACC^2$ as an additional regressor (models 8, 10, and 12 of Panel B), we find that $ABACC^2$ is significant in each model, where we see that it is opposite in effect as compared to smoothing. Indeed, $ABACC^2$ is negatively and significantly related to *Institution* and *Institution_Trading*, and positively and significantly related to *Transient*, the latter possibly indicating transient investor preferences for opaque earnings.[8]

5.3. Smoothing and share turnover and trading volume

Pastor and Stambaugh (2003) provide evidence that periods of high volatility also coincide with periods of market illiquidity. Trading itself is positively related to share price volatility (Dichev et al., 2011; Jones et al., 1994). To measure liquidity, we calculate *Turnover* as total shares traded during the year divided by total shares outstanding, and we calculate *Trading*, as the number of trades during the year. Data for the former is drawn from the *Compustat* annual files, while the latter is selected from the *CRSP* monthly files. Results are presented in Panel C of Table 4.

In models (13) and (15) we see that smoothing is negatively related to both one year ahead *Turnover* (*t*-statistic = -8.71) and one year ahead *Trades* (*t*-statistic = -2.96), hence liquidity is decreasing in smoothing. When we add $ABACC^2$ to the regression (models 14 and 16), we find that it is significantly related to both one year ahead *Turnover* and *Trades*, but its effect is opposite to the one of *Corr*.[9]

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[8] Including *DD* instead of $ABACC^2$ in models 10, 12 and 14 conclusions are similar: *DD* is negatively and significantly related to one year ahead *Institution* and *Institution_Trading*, and non-significantly related to one year ahead *Transient*.

[9] If we include *DD* instead of $ABACC^2$ in models 14 and 16, we see that *DD* is positively related to one year ahead *Turnover* and non significantly related to one year ahead *Trades*.

5.4. Smoothing and real firm risk

In this section we examine how smoothing relates to underlying true firm riskiness, of which volatility is a byproduct. We utilize two measures of the probability of bankruptcy drawn from Hillegeist et al. (2004): *Bankruptcy1* (*Bankruptcy2*) is an estimate of the actual (risk neutral) probability of bankruptcy according to the Black-Scholes-Merton option pricing model. Also, we utilize a dummy variable that is equal to 1 for the lowest quintile of the change in *ROA* (*LargeDecreaseROA*), i.e., a large drop in accounting performance. We see that *Corr* is negatively related to one year ahead firm distress measures, *Bankruptcy1*, *Bankruptcy2*, and *LargeDecreaseROA* (models 17, 19, and 21), while when we add $ABACC^2$ (models 18, 20, and 22), we see the opposite effect: large abnormal accruals are positively related to one year ahead distress measures.[10]

Collectively, the empirical evidence provided in this section (Table 4, Panels A, B, C, and D) indicates that income smoothing is related to factors that are known to be associated with stock price volatility, as evidenced by sell-side analyst and institutional activity, liquidity and trading behavior, and firm risk. Such relations are consistent in all cases with the main finding presented in Table 3: smoothing is negatively related to idiosyncratic volatility. Moreover, unreported results indicate that all our dependent variables in Table 4 are individually related to idiosyncratic volatility.

Additionally, although income smoothing is defined as a special case of earnings management (Turcker and Zarowin, 2006), we find that the capital market effects of smoothing are different than that of *prima facie* earnings management. In fact, in a number of our specifications (especially in relation to institutional investors, liquidity, and firm risk), we indeed find that *Corr* and $ABACC^2$ are opposite in sign to the volatility related factors, in line with our findings in models 4 and 5 of Table 3. This evidence is consistent with the notion that different types of earnings management (arguably, with a different set of underlying incentives), lead to different capital market consequences.

6. INCOME SMOOTHING AND INCREASES IN IDIOSYNCRATIC VOLATILITY

Results shown so far indicate that income smoothing, on average, is negatively related to idiosyncratic volatility. Nevertheless, as our hypothesis development suggests, there

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[10] The same results are obtained when we include *DD* instead of $ABACC^2$ in models 18, 20 and 22.

may be situations in which idiosyncratic volatility could be increasing in income smoothing. In this section, we investigate situations where smoothing is detected (or is expected), is clearly visible to market participants, or is excessive, and therefore has the potential to undermine the credibility and the assumed benefits of reporting a smooth earnings stream. Results are presented in Table 5.

We begin by examining the relation between smoothing and volatility in low performing firms. Our motivation stems from a long stream of research that argues that managers have incentives to manage earnings in situations of financial distress, in order to paint a rosier picture in relation to actual firm performance, and to convey positive signals about future firm prospects (e.g. Sweeney, 1994; DeFond and Jiambalvo, 1994). Model (1) of Table 5 shows the results of our main model where instead of *Corr* we include its interaction with five dummy variables that equal 1 in each *ROA* quintile (*ROA1...ROA5)*. Results reveal that the effect of smoothing on one year ahead volatility is markedly different in the lowest *ROA* portfolio. The coefficient of *Corr*ROA1* is positive and statistically significant (*t*-statistic = 7.20), while in the rest of the sub-groups the relation is reversed and is consistently negative (*t*-statistics ranging from -3.92 to -11.67).[11] This evidence indicates that income smoothing is positively related to idiosyncratic stock price volatility in poorly performing firms. To understand this particular mechanism better, in untabulated tests we find that in poorly performing firms, *Corr* is still highly negatively related to the standard deviation of net income, but now it is also positively related to asset sales, while there is no relation between *Corr* and asset sales in the other *ROA* quintiles. This indicates that investors are apprehensive of transitory accruals in times of distress, even if the resulting income stream is smoother.

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[11] Conducting separate regressions in each performance quintile leaves inferences unchanged. Running the same regression as in model (1) of Table 3 in the lowest *ROA* quintile, *Corr* is positive to one year ahead *Volat*, while in the rest of the *ROA* quintiles, smoothing remains negative to idiosyncratic volatility.

TABLE 5.
INCOME SMOOTHING AND INCREASES IN IDIOSYNCRATIC VOLATILITY

Model (1) presents the results of an OLS regression of one year ahead firm idiosyncratic volatility (*Volat)* on the interactive effects between income smoothing and five *ROA* quintile dummies (*Corr*ROA1…Corr*ROA5*). Tests in Models (2) and (3) involve the sub-sample of firms that report a smoother income stream. Model (2) shows the results of an OLS regression of one year ahead firm idiosyncratic volatility (*Volat)* on a proxy for smoothing through special items (*SpecialItems_Smooth*), calculated as a dummy variable that equals 1 if a decrease (increase) in pre-managed earnings is offset by an income increasing (decreasing) special item, and 0 if this offset is done through other accruals. Finally, model (3) shows the results of an OLS regression of one year ahead firm idiosyncratic volatility (*Volat)* on a proxy for extreme smoothing behavior (*Extreme_Smooth*), which is a dummy variable that equals 1 if the change in pre-discretionary earnings is opposite in sign to the change in reported earnings, i.e, there is an increase (decrease) in pre-discretionary earnings and a decrease (increase) in reported earnings, and 0 if the change in reported earnings is of the same sign as the change in pre-discretionary earnings, but lower in absolute value. All the models in the table include the set of control variables included in Table 3 (*LogAssets, ROA, MB, Leverage* and *DevCFO*), and year and industry dummies. For the sake of brevity, we only report coefficients and *t*-statistics for the variables of interest. All continuous variables are winsorized at 1% and 99%. The *t*-statistics are adjusted for clustering on both firm and year. Levels of significance are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1.

	Model 1 $Volat_{t+1}$	Model 2 $Volat_{t+1}$	Model 3 $Volat_{t+1}$
Corr*ROA1	0.0095***		
	[7.20]		
Corr*ROA2	-0.0030***		
	[-3.92]		
Corr*ROA3	-0.0107***		
	[-11.67]		
Corr*ROA4	-0.0101***		
	[-10.35]		
Corr*ROA5	-0.0057***		
	[-5.29]		
SpecialItems_Smooth		0.0027***	
		[3.80]	
Extreme_Smooth			0.0013***
			[2.95]
Observations	118,015	53,918	53,917
R-squared	36.2%	33.67%	33.65%

Given the previous result suggesting that transitory items may underlie the documented positive relation between income smoothing and stock price volatility in low performing firms, we next examine situations where smoothing is done through the utilization of special items, which have been shown to be highly transitory (Lipe, 1986; Fairfield et al., 1996), to be opportunistically timed (Marquardt and Wiedman, 2004; Burgstahler et al., 2002), and to lead to lower earnings quality (Cain et al., 2012). In this section, rather than examining *Corr* as we previously have done, we examine the primary building blocks of income smoothing, to directly incorporate the role of special items into the analysis. We proceed by first identifying the firms in our sample that have a smoother income stream in comparison to the prior year, i.e., those where the annual change in the standard deviation of income is negative. Then we partition this sample into two: firms that smooth using special items and those that smooth through other accruals. In other words, we define a dummy variable, *SpecialItem_Smooth*, which equals 1 whether a decrease (increase) in pre-managed earnings is offset by an income increasing (decreasing) special item, and 0 if this offset is done through other accruals. We compare the volatility effects of these two groups. Results are presented in model (2) of Table 5, where we see that the coefficient of *SpecialItem_Smooth* is positive and statistically significant (*t*-statistic = 3.80), which indicates that smoothing that is facilitated by special items is positively related to one year ahead idiosyncratic volatility. Moreover, in unreported results we find that *SpecialItem_Smooth* is positively associated to bid-ask spreads, i.e., a garbling effect. Finally, untabulated results also indicate that our relations are not driven by the mere presence of special items, since including it as an independent regressor leaves results intact.

Finally, we examine situations of extreme smoothing, where declines in unmanaged performance are offset by an extreme increase in earnings management, or vice versa. Since smooth income acts as a moderator to changes in unmanaged income, in our ensuing test we examine how the magnitude of this moderating mechanism affects volatility. Again we utilize the firms in our sample that have smoother income streams in comparison to the prior year. Then, we identify situations where smoothing is excessive, which refers to situations where the change in reported earnings is different in sign than that of the change in unmanaged earnings. To illustrate this, consider two firms, A and B, both of which have a decrease in unmanaged income. Firm A also has a decrease in reported earnings (but less of a decrease than the decrease in unmanaged earnings), while firm B has an increase in reported earnings. In our subsequent tests, we label firm B as an «extreme» smoother (*Extreme_Smooth* = 1), since it reports an increase in *ROA* when pre-managed earnings have fallen, while firm A only tempers this fall but still reports a

decrease in earnings. The purpose of this analysis is to compare the volatility related consequences of the smoothing patterns of firms A and B.

Model (3) of Table 5 presents the results of the OLS regression of one year ahead volatility on *Extreme_Smooth* and all the controls included in model (1) of Table 3. We can see that *Extreme_Smooth* is positively related to idiosyncratic volatility (*t*-statistic = 2.95). Further untabulated analysis indicates that such extreme smoothing leads to a garbling effect, since it is is positively associated with bid-ask spreads and negatively related with the probability of informed trading, calculated as per Easley et al. (2002). Moreover, extreme smoothing is associated with transitory patterns in accruals: situations where abnormal accruals are used to offset a decrease in unmanaged earnings and result in an increase in reported earnings, are associated with more positive special items (and less negative special items), more gains (and less losses) on asset sales, and more «other» gains; in contrast, situations where abnormal accruals are used to offset an increase in unmanaged earnings to result in a decrease in reported earnings, are associated with more negative special items (and less positive special items), and more losses on asset sales.

In sum, although results in sections 4 and 5 indicate that smoothing is, on average, negatively related to volatility, this section documents instances where the relation is reversed. In poorly performing firms, in instances where smoothing is visible, and when smoothing is extreme, we document that volatility effects are positive.

7. OTHER UNREPORTED ANALYSES

In this section we conduct a number of unreported tests to establish the validity of our main finding. We re-run our tests using alternate measures of income smoothing and idiosyncratic volatility and alternate estimation techniques. We examine the costs/benefits of smoothing. We control for information and risk proxies, and also for governance and CEO equity holdings. All tests discussed in this section are based on model (1) in Table 3.

7.1. Alternate measures of income smoothing and idiosyncratic volatility

We repeat our analysis using several alternative measures of income smoothing. We first calculate four different versions of our income smoothing measure, *Corr*: (a) using the

model developed by Kothari et al. (2005), which controls for accounting performance, in estimating discretionary accruals; (b) using the model developed by Bowen et al. (2008), which controls for cash flows from operations, in estimating discretionary accruals; (c) utilizing cash flow from operations instead of pre-discretionary earnings to proxy for unmanaged performance, i.e., we re-estimate *Corr* as the correlation between changes in discretionary accruals and cash flow from operations; and (d) considering a five-year instead of a three-year horizon in the computation. Results remain intact.

Next we examine alternate measures of income smoothing previously utilized in prior research. We use the volatility of income with respect to the volatility of cash flows (Myers et al., 2006), and the correlation between changes in accruals and changes in cash flows (Leuz et al., 2003). We additionally use a two-stage regression procedure similar to Francis et al. (2004), and to LaFond et al. (2007), where the residuals of a regression of income smoothness on firm-level economic fundamentals are used to proxy income smoothing. We also use the method suggested by Jayaraman (2008), by calculating the difference between the volatility of earnings and the volatility of cash flows. Finally, since our descriptives indicate that *Corr* is right skewed, which could be potentially problematic in terms of the efficiency of our estimation, we also employ ranks of *Corr*, by classifying it into 10 groups adjusted for industry and year.[12] In all these specifications, our results remain intact.

We also re-run our main model employing alternative measures of idiosyncratic volatility. First, we use the Fama and French (1992) three-factor model, the residuals from market model regressions, and the residuals from industry level regressions. Second, since the time matching of our variables, shown in Figure 3, is noisy in the sense that there is often a significant lag from the end of the fiscal year to the forthcoming calendar year where volatility is calculated, we estimate three alternative measures of our *Volat* variable using data from the month right after the earnings announcement date until three, six, and eleven months after.[13] Measuring volatility in a short horizon after the earnings announcement has the advantage that volatility is not affected by forthcoming earnings news. Finally, Ball and Shivakumar (2008) argue that earnings provide information around the quarterly earnings announcement, which in turn moves stock prices. To show that our results are not solely based around four quarterly earnings announcement periods during the year, we re-calculate idiosyncratic volatility by

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[12] This method of ranking by industry and year is also advantageous as it potentially provides for a stronger control in filtering out systematic factors in income streams.

[13] Data for this analysis is available only after 1984.

excluding ten days around earnings announcements. Any of these alternative ways to calculate idiosyncratic volatility leaves our basic inferences unchanged.

7.2. Alternate estimation procedures

We used a firm fixed-effects specification to control for unobservable firm-specific heterogeneity. Examining a fixed-effects model is a more stringent test for our purported relations as it controls for unobservable firm specific characteristics. *Corr* is still negative and significant to one year ahead *Volat* (*t*-statistic = - 4.35), implying a structural relation between the two.

We also show that our results are robust to time trends in income smoothing and idiosyncratic volatility, as they remain unchanged in Fama-MacBeth (1973) type regressions, and in sub-periods where there are no time trends, *a la* RV, in the relevant variables. Furthermore, conducting a Granger (1969) type analysis, and utilizing the change in volatility as the dependent variable, leaves results intact. Finally, our results hold when using of a two-step GMM estimation procedure, where the potential endogeneity of smoothing is considered by instrumenting it using its own lags and/or several lags of volatility and control variables.

7.3. Cost/benefits of smoothing

Given that CEOs smooth to temper the effects of risk, these effects should be most pronounced in firms that have a high cost/benefit relation regarding the outcomes of smoothing. We examine the effect of institutional investor ownership, and sell side analysts, on the smoothing-idiosyncratic volatility relation. Institutional investors are sophisticated investors who have been shown to be able to see through accounting numbers (Ke and Ramalingegowda, 2005; Chung et al., 2002). Yu (2008) argues that firms that are followed by more analysts manage their earnings less. Our analysis consists of estimating our base model by including additional controls for high institutional ownership, and sell-side analysts, and interacting them with our smoothing variable. Untabulated results indicate that the interactions of *Corr* and two dummy variables representing high levels of both institutional ownership and analyst coverage are positive and significant to volatility. Hence, smoothing has a less pronounced effect on volatility when there is intense monitoring by institutions and analysts, where the costs of smoothing are higher.

Research also suggests that firms under the risk of litigation are less likely to manipulate earnings (Barron et al., 2001). To examine managerial propensity to smooth, and volatility related consequences in the presence of litigation risk, we rely on the methodology proposed by Kim and Skinner (2012), and construct a dummy (*Litigation*) for biotech firms, computer firms, electronics firms, and retail firms. Running our main model including an interaction of *Litigation* with *Corr* indicates the following: *Corr* is still negative and significant, *Litigation* is non-significant, and the interaction *Corr*Litigation* is positive and significant. Again, smoothing has a less pronounced effect on volatility when its costs are potentially higher.

Finally, motivated by Bushman et al. (2010), who show that CEO forced turnover increases with idiosyncratic volatility, we investigate whether managers facing a higher probability of dismissal, and so having potentially higher benefits from smoothing, are more likely to alter volatility. We perform an analysis consisting of estimating the *ex ante* CEO firing probability for our sample firms, and interacting it with *Corr*. This measure, *Firing*, is constructed in two steps: first, in the subsample where CEO turnover data is available, we estimate a logistic regression to model forced CEO turnover, utilizing as predictors CEO ownership, *ROA*, 3-year trend in *ROA*, volatility of cash flows and returns, institutional holdings, and year dummies; next, we apply the coefficient estimates to our sample firms. Results indicate that *Firing* is positive to volatility, and the interaction *Firing*Corr* is also positive and significant, suggesting that managers are more likely to smooth to temper volatility when the probability of dismissal is high.

7.4. Controls for firm level governance structures

Our next robustness tests aim to control for firm governance structures, which have been widely linked to the financial reporting characteristics of host firms (Klein, 2002). Governance is also related to share volatility (Ferreira and Laux, 2007). Including as additional controls in our main model the percentage of independent directors on the board, the Gompers et al. (2003) anti-takeover index, and the percentage of shares held by the top 5 institutional investors (see Hartzell and Starks, 2003), *Corr* remains negatively and significantly related to one year ahead *Volat*.

7.5. Controls for CEO equity holdings

We next test for the robustness of our results to CEO equity holdings. Previous research indicates that shareholdings and stock options are affected by the level of firm risk

(Carpenter, 2000). Additionally, equity incentives are related to financial reporting decisions (Bergstresser and Philippon, 2006; Cheng and Warfield, 2005). Therefore, we control for: the percentage of firm shares held by the CEO, the logarithmic form of the dollar value of all options held by the CEO, the dollar value of shares, and the number of options held divided by total shares outstanding. Results remain intact.

7.6. Tests for risk/information proxies

In section 2.2 we argued that the relation between income smoothing and volatility could be due to firm risk, or due to the informational properties of earnings (including garbling). To control for risk, we introduce the probability of bankruptcy (using the Altman, 1968, z-score measure), industrial diversification, future operational volatility, and accounting losses. As a measure of information, we control for private measures of information, such as *PIN* (as per Easley et al., 2002), bid-ask spreads, and *Private* (as per Llorente et al., 2002). Again, our results remain intact.

7.7. Volatility around annual earnings announcements

We attempt to provide corroborating evidence as to the extent to which the smoothing/volatility relation is concentrated around annual earnings announcements. This analysis is relevant because examining the volatility of returns around a small window is likely to capture information, rather than noise. Moreover, it provides for a stronger setting to capture cause and effect. We calculate the 3-day volatility around the earnings announcement date (*Volat3*), and results indicate that smoothing is also negatively related to this measure of volatility (*t*-statistic = -5.53).

7.8. Other tests

To attenuate concerns regarding correlated omitted variable problems, we also perform an additional array of untabulated tests. We sequentially introduce as a control variable, share returns over the prior year (both raw returns and market adjusted returns), changes in firm operating risk (measured as *DevCFO* – lagged *DevCFO*), a dummy for acquisitions, a dummy for illiquid firms, firm operating cycle (both receivables and inventory turnover ratio), change in sales, the standard deviation of sales, and change in earnings (measured as *ROA* – lagged *ROA*). Our results remain intact.

8. CONCLUSIONS AND LIMITATIONS

We examine whether the stock price volatility effects of the use of financial reporting flexibility to smooth income are consistent with managers' beliefs that by smoothing income numbers they reduce investors' perception of firm risk. By relating income smoothing to the idiosyncratic component of stock price volatility we add to the still scarce literature on the economic effects of income smoothing. Our results reveal a negative association between income smoothing and idiosyncratic risk, which we interpret as evidence that income smoothing practices contribute to reduce stock price idiosyncratic volatility. However, when smoothing is excessive, or highly visible, or conducted in poorly performing firms, it leads to higher volatility. Overall, our results suggest that, whilst income smoothing tends to reduce stock return volatility on average, investors exhibit differential responses to discretionary reporting choices. Indeed, we find that in cases where income smoothing appears to reduce information quality and/or otherwise lacks credibility as a signal of reduced equity risk, it is associated with higher stock return volatility, which indicates that in practice investor responses to income smoothing may be both more sophisticated and variable than previously realized.

Our statistical models and measured variables are subject to a number of limitations that could affect the results. First, we treat a number of variables as exogenous although they could be endogenously determined. Second, some of the proxies for the theoretically guided factors could be incomplete. Where such variables are measured with bias, or are incomplete, our inferences remain prone to error. Finally, our results are valid as long as no omitted variable is correlated with our income smoothing and idiosyncratic volatility variables.

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