Intangible assets and the trend in the accruals-cash flow association

ABSTRACT

Recent research documents a weakening of the negative association between accruals and cash flows and raises the concern that accounting usefulness may be declining. We provide evidence that the documented weakening of the association does not result from a loss of accounting usefulness per se, but from deficiencies due to a specific accounting practice and a specific design choice made by researchers, which can be corrected. At the core of the problem is the departure from the matching principle resulting from the current accounting treatment of intangible investments. More specifically, the weakening of the negative association is driven by the increasing level of intangible investments, which are expensed rather than capitalized, and by researchers' choice to scale accruals and cash flows by total assets, which are understated for intangible-intensive firms. Treating intangible expenditures as capitalized investments and using alternative scaling options practically eliminate the weakening trend in the correlation between accruals and cash flows.

1. Introduction

A primary role of accrual accounting is to smooth temporary timing fluctuations in operating cash flows. An implication of this role is that contemporaneous accruals and operating cash flows are negatively associated (Dechow 1994). However, recent studies suggest that this fundamental negative association between assets-scaled accruals and assets-scaled operating cash flows has been declining, with the association approaching zero in recent years (e.g., Bushman et al., 2016; Nallareddy et al., 2017). This empirical pattern raises concerns about potential changes in accounting usefulness. We argue that the concern about the usefulness of accounting might be exaggerated. In particular, we show that the documented weakening of the correlation between accruals and cash flows does not necessarily result from a loss of accounting usefulness per se, but from deficiencies associated with a specific accounting practice and a specific design choice made by researchers, which can be corrected.

Contrary to Bushman, Lerman, and Zhang (2016), who conclude that intangibles only plays a small part in the weakening of the correlation between accruals and cash flows, we contend that time-series changes in firms' intangible intensity are likely the primary driver for the weakening of the correlation. Our contention is based on the historical increase in the prevalence of intangible investments, the current accounting treatment of investments in intangible assets, and the current practice by researchers of deflating accounting level variables by assets. We argue that, overall, these factors directly induce the documented decline in the association between assets-scaled accrual and assets-scaled cash flow. Our argument is consistent with Lev (2018), which discusses several potential implications of the current accounting treatment of intangible investments.

First, we note that investments in tangible assets are capitalized, with no immediate impact on accruals or operating cash flows (the cash outflow is instead classified as *investing* cash flows). When the assets are later used up, the firm records negative accruals (depreciation, cost of goods sold, etc.), which are matched against the revenues/operating cash flows generated by the assets, inducing a negative association between accruals and operating cash flows. This process breaks down in the case of intangible investments. Such investments are treated as operating expenses rather than amortizable assets, generating (1) operating cash outflows without any corresponding effect on accruals in the period of the investments and (2) cash revenues without any corresponding effect on accruals in future periods.[1] Hence, if, over time, companies invest relatively more in intangible assets,[2] then it is natural for the covariance between cash flows and accruals to decrease. In addition, since investment in intangible assets is riskier than investment in tangible assets, investment in intangible assets increases the variance of operating cash flows. A decreased covariance and an increased variance of cash flows lead to a lower coefficient in accruals-cash flows regressions. Moreover, as companies increase investments in intangible assets, the increased cash flow variance will cause the properties of intangible intensive companies to be emphasized in sample statistics. We refer to this effect as the numerator effect.

Second, because intangible assets are not capitalized, accounting assets, which are used to deflate accruals and cash flows, do not adequately capture the scale of intangible-intensive firms. Because assets are less relevant as a measure of scale as firms get more intangible intensive, then it is natural for the association between assets-scaled accruals and assets-scaled cash flows to weaken as intangible intensity increases. Moreover, because assets are disproportionately small for intangible intensive firms, all else being equal, more intangible intensive firms will have more extreme asset-scaled accruals and asset-scaled cash flows. As a result, when regressing asset-scaled accruals on asset-scaled cash flows, high-intangible firms are emphasized in the estimated statistics. Compared to other firms, high-intangible firms have a weaker accruals-cash flows

[1] The accounting treatment of internally generated intangible assets are different from that of acquired intangible assets. While the former is mainly expensed, the latter is capitalized. In this paper, we study internally generated rather than acquired intangible assets.

[2] Table 2 shows that companies, on average, have been increasing investments in intangible assets and decreasing investment in tangible assets.

association.[3] Thus, overemphasizing these firms in the estimated accruals-cash flows association can lead to a declining trend in the estimated association. We refer to this deflator factor as the denominator effect.

Consistent with prior research, our study shows that the intangible investments that affect net income and operating cash flows, namely research and development (R&D) and advertising expenses, have increased over time. We test whether the reporting for intangible assets and scaling by understated total assets explain the weakening trend in the accruals-cash flow association. We approach the analysis differently from Bushman, Lerman, and Zhang (2016), who test whether intangible investments affect the weakening trend in the accrual-cash flow association using a two-stage approach. For each year, they regress accruals on cash flows and obtain the coefficient of cash flows. Then, they regress the estimated coefficient on a time trend variable and the annual average value of intangibles. Rather than adding an annual average value of intangibles as a control variable in the accruals-cash flow regression, we attempt to fix the problems created by the expensing of intangible investments by making adjustments to the numerators and denominators of assets-scaled accruals and asset-scaled cash flows. We also compare the association between accruals and cash flows across high-intangible intensity and low-intangible intensity firms.

To remove the distorting effect of intangible investments on the numerator, we treat expenditures on intangible assets as investments in the same way as expenditures on tangible assets. We do so by adding back R&D and advertising expenses, when available, to reported operating cash flows. This adjustment is consistent with classifying cash spent on investments as investing cash flows. We also add back R&D and advertising expenses to net income and then assume a useful life for amortization purposes. We follow prior research (e.g., Kothari, Laguerre, and Leone 2002) and use a five-year useful life. We also test for the sensitivity of the results to

[3] Table 3 shows that high-intangible firms have a weaker accruals-cash flows association than low-intangible firms.

reasonable variations from the five-year life assumption. To remove the effect of unrecognized intangible assets on the denominator, we conduct the analysis with (1) unscaled measures of accruals and cash flows and (2) accruals and cash flows scaled by market value of equity, which is not typically affected by the accounting problem from unrecognized intangible assets. The use of market value of equity as the deflator is consistent with Dechow (1994), which is one of the first studies to document a negative association between cash flows and accruals.

Consistent with our conjecture that the observed decrease in the association between accruals and cash flows could be due to the increase in intangible intensity over time, we find that, even after controlling for year and firm fixed effects, the association between and cash flows is significantly weaker for high-intangible intensity firms than for low-intangible intensity firms. We then turn to the impact of adjusting the scaled variables for the effects of the current accounting treatment of intangible investments and the choice of assets as the deflator. First, consistent with our adjustments being effective at addressing the problems that we identify, adjusting the numerators and denominators of the accrual and cash flow measures increases the coefficients, the *t*-statistics, and the adjusted R^2s from accruals-cash flow regressions. Second and more importantly, the adjustments seem to remove the entire trend in the association between accruals and cash flow. After making the numerator adjustments, the declining trend in the association between accruals and cash flows substantially weakens. Similarly, after making the denominator adjustments by using unscaled accruals and cash flows or by scaling them by market value of equity, the trend substantially weakens. Most notably, after making both the numerator and the denominator adjustments, the declining trend in the accrual-cash flow association practically disappears. Finally, the coefficient on the interaction between cash flow and an indicator for high intangible intensity is positive and highly significant when we do not make any adjustment to the scaled accruals and cash flow variables. The high-intangible-intensity effect totally disappears when we adjust the variables for the effects of the current accounting treatment of intangible investments and the choice of assets as the deflator, although the negative association between accruals and cash flow is apparently much stronger after the adjustment.

Our findings are important for several reasons. One, academics and standard setters may draw inferences about the quality and usefulness of accounting from trends documented in recent research. Two, prior research studies the implications of using different deflators (e.g., Barth and Kallapur 1996; Brown, Lo, and Lys 1999; Easton and Sommers 2003; Barth and Clinch 2009). We contribute to this literature by showing that scaling by assets when investments in intangible assets are increasing can have substantial impacts on research inferences. Three, intangible assets have become a critical facet of our modern economy. While our results maintain the concern from other research that expensing investment in intangible assets can distort reported accounting numbers, we conclude that the concerns that a changing accruals-cash flow association reflects declining accounting quality are likely not as general as often assumed. The documented weakening of the association seems to result from the increasing level of intangible investments, which are expensed rather than being capitalized, and by researchers' choice to scale accruals and cash flows by total assets, which are understated for intangible-intensive firms. These issues can be corrected. Treating intangible expenditures as capitalized investments and using alternative scaling options practically eliminate the weakening trend in the correlation between accruals and cash flows. While the focus of our study is not on the proper accounting treatment of intangible investments, we will note that several alternative approaches of accounting for intangible investments have been proposed (see, e.g., Lev 2018).

The remainder of this paper is organized as follows. Section 2 discusses related research. Section 3 describes our research design. Section 4 describes the data. Section 5 discusses the empirical results and Section 6 concludes.

2. Related literature

The relation between accruals and cash flows has generated a large literature in accounting research and has been argued to reflect accounting quality through income statement accruals (Dechow, Ge, and Schrand, 2010). This extant research has documented a strong negative contemporaneous correlation between operating cash flows and income statement accruals (Dechow and Dichev, 2002). This negative correlation is expected if accruals smooth shocks to operating cash flows. However, Bushman, Lerman, and Zhang (2016) show that this contemporaneous negative correlation has weakened over time to the point where the negative accrual-cash flow relation seems to have disappeared. Given the central role of accruals in accounting, this phenomenon raises concerns about the possibility that accrual usefulness has been declining over time. Bushman, Lerman, and Zhang (2016) test several explanations for the declining association between accruals and cash flows. These explanations are based on accounting outcomes that are arguably related to the usefulness of accounting reports. More specifically, the declining usefulness of accounting has been attributed to accounting items such as special or one-time items and to increasing intangible intensity (Bushman, Lerman, and Zhang, 2016; Dichev and Tang, 2008; Curtis, McVay, and Toynbee 2018; Nallareddy, Sethuraman, and Venkatachalam, 2018). Bushman, Lerman, and Zhang (2016) find that special items and the prevalence of losses are the most important explanations for the weakening association between accruals and cash flows.

Additionally, other researchers have highlighted the potential flaw in accounting standards that require the expensing of investments in intangible assets (Lev and Sougiannis, 1996; Lev, Sarath, and Sougiannis, 2010). This research points to the potential deterioration in accounting usefulness when intangible assets have become a more important part of the economy (Srivastava, 2014). Based on the historical increase in the prevalence of intangible investments, the current accounting treatment of investments in intangible assets, and the deflation of accruals and cash flows by assets, we posit that the weakening in the association between assets-scaled accrual and assets-scaled cash flows could be driven by the time-series increases in intangible investment.

Because investments such as R&D and brand building are recorded as expenses in the income statement in the period when the investments are made, operating cash flows, net income, and assets are understated. The practical difficulty with measuring the asset value and revenue associated with the intangible investments justifies the continued expensing of these investments (Kothari, Laguerre, and Leone, 2002). However, standard-setting disagreements currently exist. For instance, U.S. GAAP requires that R&D expenditures be expensed in the period they are incurred, except in some specific cases, such as late stage software development. The International Financial Reporting Standards (IFRS) require capitalizing development expenditures as assets, so long as some criteria related to the feasibility of completing or using the assets are met. Not surprisingly, some academics continue to raise concerns about the U.S. GAAP accounting for intangibles (Lev, 2018).

Bushman, Lerman, and Zhang (2016) conclude that increasing intangible intensity only plays a limited role in explaining the trend towards a weakening association. To reach this conclusion, they follow Srivastava (2014) by looking at the changing composition of new IPO companies and, more specifically, the increasing intangible intensity of IPO firms. We use a different approach to testing the effect of intangible intensity on the weakening trend in the association between accruals and cash flows. Specifically, we try to mitigate the potential measurement problems associated with intangible investments and assess the effect of our adjustments on the trend in the accrual-cash flow association.

3. Research design

3.1 Correcting for the impact of intangible investments

To control for the potential effect of intangible intensity on the association between accruals and cash flow, prior studies use proxies for intangible intensity as control variables. However, as we explained earlier, the issue associated with intangible intensity is a variable measurement problem, which is unlikely to be addressed with the inclusion of control variables in a regression framework. Such a problem is more likely to be addressed by fixing or mitigating the measurement problem, which is the approach that we take in this study. More specifically, we attempt to correct the accruals and cash flow measures for the potential biases created by expensed intangible investments. This approach is similar to the method used in prior research on R&D that sought to measure, and correct for, R&D expensing biases (Lev and Sougiannis, 1996).

Before describing our measurement corrections, we provide further reasons why our adjustments are important and are likely to be more powerful than the Bushman, Lerman, and Zhang (2016) approach that takes the measurement of accruals and cash flows as given and controls for changing intangible intensity. To do so, consider a simple regression model setup, where x is operating cash flows, y is accruals, $\bar{x}$ and $\bar{y}$ are the means of x and y, σ is the variance of x, and β is the estimated regression coefficient:

$$\beta = \frac{\sum_{1}^{n}(x-\bar{x})(y-\bar{y})}{\sigma_x}$$

There are two primary ways that the estimated negative coefficient can become weaker over time. One is for the variance of x to increase over time, which would occur as companies invest more in intangible investments. Such investments result in more variable cash flows than tangible investments. The second is for intangible investments to alter the covariance of accruals and cash flows. Consider the case of two types of companies (non-intangible-intensive companies and intangible-intensive companies), with A and B representing the number (and type) of non-intangible-intensive companies and intangible-intensive companies, respectively. The covariance component of the estimated coefficient can be stated as follows:

$$\sum_{1}^{A}(x-\bar{x})(y-\bar{y})+\sum_{1}^{B}(x-\bar{x})(y-\bar{y})$$

There are two ways intangible intensity can affect the covariance. The first is for the number of intangible-intensive (type B) firms to increase. The second is for the variance of x or y to increase more for the type B firms than for the type A firms, causing the total covariance to become more weighted towards the covariance of B type firms. Because, in reality, the variance of cash flows is greater for intangible-intensive firms, type B firms have greater weight in the estimated covariance. Additionally, because accounting assets are understated for intangible-intensive firms, the weighting of intangible-intensive firms in the covariance between accruals and cash flows increases when accruals and cash flows are scaled by assets.

An important motivation for our study comes from the observation that the trend in the association between accruals and cash flows cannot easily be explained by a linearly included control variable. This problem is inherent in the non-linear composition of the estimated coefficient. To further complicate the issue, within this non-linear function is embedded multiple effects of intangible intensity: the effects on the variance of cash flows, on the number of intangible intensive companies, and on the weight of intangible-intensive companies in the covariance of accruals and cash flows. These effects cannot be adequately controlled for with a single measure of intangible intensity; hence, our decision to attempt to directly correct the accruals and cash flow measures for the effect of the current accounting treatment of intangible investments.

Our first correction is to remove the treatment of intangible investments as expenses from the numerator of the deflated cash flows (*CFO*) and accruals (*ACC*) measures. We first calculate *CFO* and *ACC* as in Bushman, Lerman, and Zhang (2016). We then add intangible investments to *CFO* and subtract amortization of capitalized intangible from *ACC* to obtain *Modified CFO* and *Modified ACC*, respectively. We follow Bushman, Lerman, and Zhang (2016) and scale these variables by average total assets (*Ave Asset)* to obtain the following scaled measures of "modified" accruals and cash flows:

$$\frac{Modified\ CFO}{Avg\ Asset} = \frac{CFO + Intang}{Avg\ Asset}$$

$$\frac{Modified\ ACC}{Avg\ Asset} = \frac{ACC - Amortization}{Avg\ Asset}$$

where *ACC* is computed as change in noncash current assets minus change in nondebt current liabilities minus amortization expense from the beginning of the sample through 1987 and as earnings minus cash flows from operations from 1988 onward; *CFO* is computed as earnings before extraordinary items minus *ACC* from the beginning of the sample through 1987 and is taken as reported on the Statement of Cash Flows from 1988 onward, and *Intang* is the sum of R&D and advertisement expenditures.

Amortizing intangible assets requires estimates of the assets' useful lives. We first assume that intangible investments are amortized over a five-year useful life. We then examine the robustness of our main tests to reasonable deviations from the five-year useful life assumption. We contrast the statistics derived from our modified measures of accruals and cash flows with those used in other research, including Bushman, Lerman, and Zhang (2016).

In correcting for intangible expenditures, we set the missing R&D and advertisement expenditures observations to zero – a necessary choice that is likely to bias against finding an intangible effect. However, as long as the observed R&D and advertising expenditures have a strong enough correlation with the actual expenditures, our correction should capture, at least partly, the intangible effect, resulting in a reduction in the trend in the accruals-cash flow association. Nonetheless, as a robustness test, we repeat the analysis with only the non-missing R&D and advertisement expenditures observations.[4]

Our second correction is to the denominator of the deflated cash flow and accruals measures. To adjust for the effect of unrecognized intangibles on the balance sheet, we use two denominator choices. The first recognizes that one of the reasons for scaling level variables is to address the concern that heteroscedasticity in the error term can lead to incorrect statistical inferences (Barth and Kallapur 1996). However, heteroscedasticity does not lead to biased coefficients and thus trends in estimated coefficients should be unaffected by heteroskedastic errors. Therefore, if a coefficient is unbiased in every cross-sectional estimate, the trend estimation is valid even if there are heteroskedastic errors in every cross-sectional regression.[5] Accordingly, we examine the association between unscaled accruals and unscaled cash flows. That is, we use the "modified" accruals and cash flows measures described earlier without the asset deflator. This adjustment is straightforward and does not rely on additionally noisy measurement decisions. Without taking a position in the debate about the appropriateness of level regressions, we believe that they offer in the context of our study a convenient way to assess the potential bias induced by intangible intensity to the trend in the accruals-cash flow association due to the deflation by assets.

[4]All the key results reported in the paper are robust to deleting the missing R&D and advertising expenditures observations, although the sample is substantially reduced after the deletion.
[5] Additionally, because we are focused on the coefficient rather than the r-squared value over time we do not suffer from the across sample r-squared problem (Brown, Lo, and Lys, 1999).

Our second denominator choice recognizes that another reason for deflating accounting numbers is to express them on a common size basis to control for cross-sectional differences in firm scales that can result in biased estimates (Barth and Kallapur 1996). Deflation essentially controls for potential omitted correlated scale factors that could have nonlinear effects on the variables and their associations. Accordingly, our second alternative adjustment to the denominator consists in using a measure of scale that recognizes intangible assets at their fair value. Prior research suggests that equity market prices are somewhat efficient with respect to the valuation of intangible assets (Fama, 1998; Barth, Beaver, and Landsman, 2001; Aboody and Lev, 1998; Chan, Lakonishok, and Sougiannis, 2002; Sougiannis, 1994; Lev and Sougiannis, 1996). Because market value of equity is more likely to contain the unbiased value of intangible assets than accounting values, we use it as the scalar for deflating accruals and cash flows. Combining the numerator adjustments with this denominator adjustment, we obtain:

$$\frac{\text{Modified } CFO}{Ave\ MV} = \frac{CFO + Intang}{Ave\ MV}$$

$$\frac{\text{Modified } ACC}{Ave\ MV} = \frac{ACC - Amortization}{Ave\ MV}$$

where *Ave MV* is the average of the beginning and ending market values of equity.[6]

3.2 Estimating the association between accruals and cash flows

To examine the association between accruals (*ACC*) and cash flows from operations (*CFO*), we follow the design used in prior research and estimate the model below using either pooled or yearly cross-sectional regressions:

[6] Our inferences are robust to using ending or beginning market value instead of average market value.

$$ACC_{it} = \alpha + \beta CFO_{it} + \varepsilon_{it}.$$

Consistent with the trend documented by Bushman, Lerman, and Zhang (2016), when using the unadjusted measures of assets-deflated accruals and cash flows, β is expected to be strongly negative in the early years of the sample and to converge towards zero over time.

4. Data and validation

4.1 Data

Our data construction process follows prior research and begins by creating a sample of Compustat firms between 1964 and 2016 (inclusive).[7] Following Bushman et al. (2016), we exclude financial firms (SIC two-digit code from 60 through 69) and firm-years with significant acquisition activity (ratio of sales from mergers and acquisitions to net sales over 5%). We also exclude firms whose (inflation-adjusted) total assets or market value of assets is less than $1 million in 1964 dollars. Our final sample consists of 184,450 firm-year observations with available data. Table 1 presents summary statistics. All variables are defined in the appendix. To reduce the influence of outliers, we winsorize all continuous variables at the top and bottom one percent of distributions.

By construction, the sample statistics are similar to those in prior studies. Of particular interest in this study is that, at the mean, intangible investments expensed each year are approximately 5% of average total assets. The magnitude of expensed intangible investments is similar to that of accruals and cash flows, which have similar mean absolute magnitudes as a percent of average total assets. Because of the importance of intangible investments relative to the magnitude of accruals and cash flows, intangible investments have the potential to substantially alter the measurement of accruals and cash flows and their association.

[7] We employ several specifications used by Bushamn et al. (2016). To make our results comparable, we follow their paper and start our sample beginning in 1964.

4.2 Increasing intangible intensity

The primary motivation for our paper comes from companies increasing intangible investments over time. Table 2 documents the increasing trend in intangible investments over time using our measure of intangible investments. We define intangible investment as the sum of R&D expenses and adverting expenses scaled by average total assets. We then calculate the equal- and value-weighted average intangible investments each fiscal year. We weight intangible investment using average total assets. We regress these measures of intangible investments on a time trend variable, *Time*, defined as the number of years since 1964 divided by 100. To understand whether intangible investments are substitutes or complements to tangible investments, we also estimate a time-trend regression for capital expenditures scaled by average total assets.

Columns (1) and (2) present the time trend tests for intangible investments. The estimated coefficient on *Time* is statistically significant. In column (1), the dependent variable is the equal weighted annual mean level of intangible investment. The estimated intercept is 0.01 meaning that in 1964, when the time trend is equal to zero, intangible asset investments are 1% of average total assets. The estimated coefficient on *Time* is 0.11 meaning that for every year that passes since 1964, intangible investments as a percentage of total assets increase by 0.11% or 1.1% per decade, corresponding to approximately 550%, relative to the 1% intercept, over the five decades in our sample. Column (2) displays the time-trend regression results for value weighted intangible investments. The time trend in this column is also statistically significant. Comparing column (2) to column (1) shows that the estimated value weighted average expenditure in 1964 is larger on a value-weighted basis. Additionally, the time trend is smaller relative to the intercept, indicating that the growth in intangible investment as a percentage of assets has been stronger among small companies.

Columns (3) and (4) present the time trend results for tangible investments. The intercepts in both columns show that capital expenditures in 1964 were a much larger percent of assets than the intangible investments for 1964 in Columns (1) and (2). The estimated coefficients on *Time* in columns (3) and (4) are significantly negative (whereas they are positive in Columns (1) and (2)). This observation suggests that firms have been substituting investments in intangible assets for investments in tangible assets. The trend in capital expenditures also differs by size. The negative trend in value weighted capital expenditures is much more pronounced than the negative trend in equal weighted capital expenditures, implying that the decline in capital expenditures has been greater for large than for small companies. The increasing intangible investment and decreasing tangible investment provide the basis for examining the effects of changing intangible intensity on the association between accruals and cash flows.

5. Empirical analysis

In this section, we report the results of our analysis of the effect of intangible investments on the trend in the association between accruals and cash flows. We first test whether the trend in the association between accruals and cash flows is associated with intangible intensity. We then estimate the overall effect of our proposed adjustments on the accruals and cash flows association. Finally, we assess the impacts of our adjustments for intangibles on the trend in the association between accruals and cash flows.

5.1 Association between intangible intensity and the accruals-cash flow correlation

We argue that the trend in the association between accruals and cash flows is likely due to the observed increase in intangible intensity (see Table 2). Bushman, Lerman, and Zhang (2016) find no evidence that the trend in the association between accruals and cash flows holds after controlling for their proxy for intangible intensity, annual average of SG&A expense. A more direct test of whether the trend in the accruals-cash flow association could be due to the increase in intangible intensity is to compare the association across high- and low-intangible intensive firms.

Table 3 presents the difference in the association between accruals and cash flows across firms with high and low intangible intensities. Intangible intensity is deemed high (low) if it is above (below) the sample median. The results show that, even after controlling for year and firm fixed effects, the association between accruals and cash flows is significantly less negative for the high-intangible intensity firms. This finding is consistent with our conjecture that the observed decrease in the association between accruals and cash flows could be due to the increase in intangible intensity over time.

5.2 The overall effect of the adjustments on the accruals and cash flows association

The results in Table 2 show that intangible intensity has been increasing over time and the results in Table 3 link the association between accruals and cash flows to intangible intensity. However, these results do not directly establish that the trend in the association is due to increasing intangible intensity. To more directly determine whether the trend in the association is due to increasing intangible intensity, we propose to adjust both the numerator and denominators of the scaled accruals and cash flow variables for the accounting effects of intangible investments. We expect the combined numerator and denominator adjustments for intangibles to account for the trend in the association between accruals and cash flows. However, the trend could disappear or flatten not because the trend is due to the effects of intangibles but simply because the adjustments that we make to correct for the effects of intangibles biases the overall association between accruals and cash flows downwards. Consider the extreme case where the association between accruals and cash flows totally evaporates after we apply the adjustments. In such a case, the time trend would be flat at zero. That is, the declining trend would disappear. Therefore, a focus on the disappearing trend that ignores the overall association level could incorrectly lead to the conclusion that the usefulness of accounting has not diminished when the association has actually disappeared. Hence, before we analyze the impacts of our adjustments for intangibles on the trend in the association between accruals and cash flows, we first examine their impacts on the overall association.

The results of our analysis are reported in Table 4, where we present estimates of the association between accruals and cash flows for the full sample using variations to the measurement of accruals and cash flows. Column (1) uses the traditional measures, column (2) makes the numerator adjustment, column (3) makes the denominator adjustment, and column (4) makes both numerator and denominator adjustments. If our measurement adjustments introduce additional error into the measurement of accruals and cash flows, we would expect the adjusted measures to have smaller coefficients and/or weaker statistical significance. The results do not support this possibility. From column (1) through column (4), the estimated coefficient gets more negative and the estimated *t*-statistic more significant, alleviating concerns that our measurement adjustments could be introducing noise into the measurement of accruals and cash flows. If anything, the results support the notion that our adjustments have reduced the noise caused by the accounting treatment for intangible asset investments in these variables.[8]

5.3 The effects of the adjustments on the time-trend in the accruals and cash flows association

We present the effects of the adjustments on the time-trend in the accruals and cash flows association in three parts: the effect of the numerator adjustments, the effect of the denominator adjustments, and the effect of the combined numerator and denominator adjustments.

[8] We do not include the other denominator adjustment – no denominator – in this table because the coefficients of the scaled and unscaled regressions have a different interpretation. However, the unscaled regression coefficient is also strongly negatively significant.

5.3.1 Numerator adjustments

Table 5 replicates the result from Bushman, Lerman, and Zhang (2016) that the negative accruals-cash flow correlation has weakened over time. This table also presents the same test after making numerator adjustments to the accruals and cash flow variables. We present two estimation approaches. Panel A presents the results from first estimating annual regressions of accruals on cash flows and then using the annual coefficient estimates in a separate regression testing for a time trend in these estimated coefficients. Panel B presents the results from a pooled data estimation approach in which the association between accruals and cash flows is estimated and an interaction term is included allowing for the association between accruals and cash flows to vary with *Time*. In Panel B, we also include firm and year fixed effects as a way to control for other firm or year specific effects that may also drive the accruals-cash flow association.

We replicate the main results in Bushman, Lerman, and Zhang (2016) in Columns (1) of Panels A and B. The intercept in Panel A and the coefficient on *CFO/Ave Asset* in Panel B show that the correlation between accruals and cash flows is strongly negative (-0.81 and -0.85, respectively) in 1964, when Time is set to zero. The estimated trend (estimated coefficient on *Time* in Panel A and on *CFO/Ave Asset * Time* in Panel B) is statistically significant and economically meaningful, showing a weakening association between accruals and cash flows. Results in Panel B shows that for every year after 1964 the association weakens by approximately 1.48% so that, during the 53 years in the sample, the association between accruals and cash flows approaches zero (-0.81 + 0.0148*53).

We report the results for the tests using the numerator-adjusted measures of accruals and cash flows in Column (2) of Panels A and B. In both panels, the modified measures seem to produce a smaller estimated trend. In Panel A, the coefficient on *Time* decreases from 1.86 in Column (1) to 1.46 in Column (2). Similarly, in Panel B, the coefficient on *CFO/Ave Asset * Time* decreases from 1.48 in Column (1) to 1.25 in Column (2). Overall, the evidence in Table 5 suggests that at least some of the trend in the accrual-cash flow association could be explained by the immediate expensing of intangible investments.[9] However, a full correction would require a numerator and a denominator adjustment. We take another step towards that goal in the next section.

5.3.2 Denominator adjustments

Table 6 presents the results from making the denominator adjustments to the accruals and cash flow measures. The first column is the replication column, identical to the first column in Table 5, included here for reference. The second column replaces average total assets in the denominator with market capitalization at the beginning of the fiscal year, *MV*. The third column uses unscaled accruals and cash flows.

The results show a substantial decline in the trend in the association between accruals and cash flows after we deflate these variables by market value of equity instead of assets. In Panel A, the coefficient on *Time* decreases from 1.86 in Column (1), where we deflate by assets, to 0.60 in Column (2), where we deflate by market value of equity. Actually, the coefficient is negative in Column (3), where we use the undeflated numbers. Similarly, in Panel B, the coefficient on *CFO/Ave Asset * Time* decreases from 1.48 in Column (1), where we deflate by assets, to 0.00 in Column (2), where we deflate by market value of equity. Again, the coefficient is actually negative in Column (3), where we use the undeflated numbers. The evidence in Table 6 suggests that a large part of the trend is apparently explained by the balance sheet treatment of intangible investments.[10]

[9] To test whether the smaller trend for the modified measure is *statistically* significant, we estimate two additional regressions. First we regress *ACC/Ave Asset* on both *CFO/Ave Asset*Time* and *Modified CFO/Ave Asset*Time*, in addition to the main variables. The (untabulated) results show that the coefficient on *Modified CFO/Ave Asset*Time* is significantly smaller than that on *CFO/Ave Asset*Time*. Second, we regress *ACC/Ave Asset* on the same right-hand variables and again find that the coefficient of *Modified CFO/Ave Asset*Time* is significantly smaller.

[10] To test whether the smaller trend for the MV-scaled variables is *statistically* significant, we estimate two regressions, similar to the regressions discussed in the preceding footnote. First, we regress *ACC/MV* on both *CFO/Ave Asset*Time* and *CFO/MV*Time*, in addition to the main variables. Second, we regress *ACC/Aver Asset* on the same right-hand variables. For both regressions, the (untabulated) results show that the coefficient of *CFO/MV*Time* is significantly smaller than that of *CFO/Ave Asset*Time*.

However, a full correction would require a numerator and a denominator adjustment. We take this final step in the next section.

5.3.3 Numerator and denominator adjustments

Table 7 presents the results from making both the numerator and denominator adjustments. The layout and tests in this table parallel those in the previous sections. The trend in the association between accruals and cash flows totally disappears after we apply both the numerator and the denominator adjustments. In Panel A, the coefficient on *Time* decreases from 1.86 in Column (1), where we deflate by assets, to 0.02 in Column (2), where we deflate by market value of equity. The coefficient is again negative in Column (3), where we use the undeflated numbers. Similarly, in Panel B, the coefficient on *CFO/Ave Asset * Time* shifts from 1.48 in Column (1), where we deflate by assets, to being negative in both Column (2), where we deflate by market value of equity, and Column (3), where we use the undeflated numbers.

The evidence in Table 7 does not support the notion of a weakening trend in the association between accruals and cash flows. However, reaching this conclusion requires both numerator and denominator adjustments for the accounting treatment of intangible assets. Once these adjustments are made, the trend is towards a stronger association between accruals and cash flows, if anything. The results strongly suggest that the observation of a weakening trend in the accruals-cash flow association is due to the increase in the prevalence of intangible investments, the current accounting treatment of investments in intangible assets, and the current practice by researchers of deflating accounting level variables by assets.

5.3.4 The high-intangible-intensity effect and our numerator and denominator adjustments

In Table 3, we showed that the association between accruals and cash flows varies across firms with high and low intangible intensities. More specifically, the association is significantly less negative for high-intangible intensity firms. A natural question then is whether the high-intangible-intensity effect survives our numerator and denominator adjustments. To the extent that our adjustments are effective in correcting for the measurement issues created by intangible investments, we would expect the high-intangible-intensity effect to disappear or, at least, be mitigated after we apply the correction.

The results reported in Table 8 strongly suggest that our adjustments are effective in correcting for the measurement issues created by intangible investments. In Table 3, where we do not make any adjustment to the scaled accruals and cash flow variables for the effects of the current accounting treatment of intangible investments and the choice of assets as the deflator, the coefficient on the interaction between cash flow and the indicator for high intangible intensity is 0.20, with a *t*-value of 9.17. In contrast, in Table 8, where we apply the adjustments, the high-intangible-intensity effect totally disappears. In fact, the coefficient on the interaction between cash flow and the indicator for high intangible intensity is now negative -0.07, with a *t*-value of -1.90. The disappearance of the intangible effect is remarkable, particularly when we consider that the negative association between accruals and cash flow is apparently much stronger after the adjustment as indicated by the results in Table 8 and the results that we previously reported in Table 4.

5.4 Alternative explanations for the trend in the accruals-cash flow association

Bushman, Lerman, and Zhang (2016) explore several explanations for the documented declining trend in the accruals-cash flow association. They find that including control variables for one-time and nonoperating items as well as increase in the percentage of loss firm-years reduces the trend from 0.016 to 0.006. However, even after controlling for these variables, the trend is still statistically significant, suggesting these variables *are not sufficient* to explain the declining trend. In the previous section, we show that our approach (e.g., treating intangible expenditures as investments and using market value for scaling variables) *is sufficient* to fully explain the declining trend. In this section, we test whether the declining trend is statistically significant for firms with low one-time and nonoperating items and for gain firms.

We follow Bushman, Lerman, and Zhang (2016) and define loss firms as firms with negative earnings before extraordinary items. Panel A of Table 8 presents results for estimating the regression of accruals on cash flows and an interaction term between time and cash flows. Column (1) and (2) report results for gain and loss firms, respectively. The coefficient on the trend variable is larger in Column (2) than in Column (1). A larger coefficient is consistent with results documented by Bushman, Lerman, and Zhang (2016), suggesting loss firms have a stronger declining trend than gain firms. We also show that even gain firms experience a declining trend in the accruals-cash flow association, suggesting that change in percentage of loss firms is not sufficient to explain the declining trend. In Column (3) and (4), we adjust both the numerator (by treating intangible expenditures as investments) and the denominator (by using market value as deflator) of the variables and estimate the same regressions as those in Column (1) and (2). The results in Column (3) and (4) show that, after making our adjustments, the declining trend disappears for both loss and gain groups. These results suggest that our approach is sufficient to explain the declining trend for both loss and gain firms.

We also follow Bushman, Lerman, and Zhang (2016) and measure one-time and nonoperating items as the difference between operating income after depreciation and pretax income. We take the absolute value of this proxy and scale it by average total assets. We then group firm-years in our sample into high and low one-time and nonoperating items based on the median. Panel B of Table 9 presents results for estimating the regression of accruals on cash flows and an interaction term between time and cash flows. Column (1) and (2) report results for firms with one-time and nonoperating items below the median and above the median, respectively. The coefficient on the trend variable is larger in Column (2) than in Column (1). This result is consistent with results documented by Bushman, Lerman, and Zhang (2016), suggesting firms with high one-time and nonoperating items have a stronger declining trend than firms with low one-time and nonoperating items. The trend for both groups is statistically significant. That is, even firms with a low amount of one-time and nonoperating items experience a declining trend in the accruals-cash flow association, implying that one-time and nonoperating items are not sufficient to explain the declining trend. In Column (3) and (4), we adjust both the numerator (by treating intangible expenditure as investment) and the denominator (by using market value as deflator) of the variables and estimate the same regressions as those in Column (1) and (2). The results in Column (3) and (4) show that, after making our adjustments, the declining trend disappears for both groups of firms. These results suggest that our approach is sufficient to explain the declining trend for firms with high as well as those with low one-time and nonoperating items.

6. Conclusion

We provide evidence that the documented weakening association between accruals and cash flows is primarily driven by increasing intangible intensity and the combination of the accounting treatment of intangible asset investments and researchers' choice to scale accruals and cash flow numbers by accounting assets. At the core of the problem is the departure from the matching principle resulting from the current accounting treatment of intangible investments. The accruals-cash flow association remains strongly negative under alternative approaches that correct for the reporting biases associated with intangible investments.

Overall, our study provides a more subtle interpretation of the observed trends in accounting income statement associations. We conclude that accounting continues to have the properties it always has had, while the reporting for intangible asset investments continues to present reporting and research challenges. Our findings also suggest that, given the large increase in the importance of intangible assets in the U.S. and global economies, revising the accounting for intangible investments might be warranted (Lev 2018).

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Appendix: Variable Definitions

Variable	Definition
ACC	Total accruals calculated as changes in noncash current assets (Compustat ACT-CHE) minus changes in nondebt current liabilities (Compustat LCT-DLC) minus depreciation expense (Compustat DP) from the beginning of the sample through 1987 and as earnings (Compustat IBC) minus cash flows from operations (Compustat OANCF) both as reported on the statement of cash flows from 1988 onward.
Ave Asset	The average of total assets (AT from Compustat).
CFO	Cash flows from operations calculated as Earnings before extraordinary items (Compustat IB) minus *ACC* from the beginning of the sample through 1987 and taken as reported on the Statement of Cash Flows (Compustat OANCF) from 1988 onward.
Modified ACC	Accruals (*ACC*) minus amortization of intangibles (*Intang Amor*).
Modified CFO	Cash flows (*CFO*) plus intangibles (*Intang*).
MV	Market value of equity calculated as price (Compustat abs(PRCC_F)) multiply by the number of shares outstanding (Compustat CSHO).
Intang	The sum of R&D expenditure (Compustat XRD), and advertisement expenditure (Compustat XAD); missing R&D and advertisement expenditures are set to zero.
Intang Amor	The sum of intangibles (*Intang*) over the last five years divided by 5.
Time	Number of years since 1964 divided by 100.

Table 1 - Summary statistics (N=184,450)

Variables	(1) Mean	(2) SD	(3) P25	(4) P50	(5) P75
ACC/Ave Asset	-0.06	0.12	-0.10	-0.05	-0.00
CFO/Ave Asset	0.05	0.16	0.00	0.07	0.13
ACC/Ave MV	-0.15	0.49	-0.15	-0.05	-0.00
CFO/Ave MV	0.10	0.27	0.00	0.08	0.18
ACC (in $Mil)	-110.59	501.28	-33.06	-4.39	-0.02
CFO (in $Mil)	196.08	873.39	0.07	6.67	56.61
Modified ACC/Ave Asset	-0.09	0.15	-0.13	-0.06	-0.02
Modified CFO/Ave Asset	0.10	0.14	0.03	0.10	0.17
Modified ACC/Ave MV	-0.19	0.53	-0.19	-0.07	-0.01
Modified CFO/Ave MV	0.16	0.29	0.04	0.12	0.23
Modified ACC (in $Mil)	-154.12	701.17	-46.55	-7.31	-0.71
Modified CFO (in $Mil)	250.96	1,113.72	1.13	10.41	74.33
Intang/Ave Asset	0.05	0.09	0.00	0.01	0.06
Intang/Ave MV	0.05	0.10	0.00	0.01	0.06
Intang (in $Mil)	44.50	224.52	0.00	0.48	8.93
Intang Amor/Ave Asset	0.03	0.07	0.00	0.00	0.04
Intang Amor/Ave MV	0.04	0.10	0.00	0.01	0.04
Intang Amor (in $Mil)	34.50	190.01	0.00	0.30	5.54
Ave Asset (in $Mil)	1,981.25	8,073.08	32.04	123.04	674.52
Ave MV (in $Mil)	1,801.05	7,506.07	23.90	103.33	584.34

Table 1 reports summary statistics based on the sample of Compustat firms between 1964 and 2016 (inclusive). Financial firms (SIC two-digit code from 60 through 69), firm-years with significant acquisition activity (ratio of sales from mergers and acquisitions to net sales over 5%) and firm-years whose (inflation-adjusted) total assets or market value of assets is less than $1 million in 1964 dollars are excluded from the sample. All continuous variables are winsorized at 1% and 99%. Definitions for all variables are provided in Variable Appendix.

Table 2 - Intangible and tangible investments over time

	(1)	(2)	(3)	(4)
Dependent Variable:	EW Intang	VW Intang	EW Capex	VW Capex
Time	0.11***	0.01***	-0.05***	-0.10***
	(16.35)	(2.78)	(-5.85)	(-13.19)
Constant	0.01***	0.02***	0.09***	0.10***
	(6.89)	(10.88)	(33.01)	(45.81)
Observations	53	53	53	53
R-squared	0.84	0.13	0.40	0.77

Table 2 reports the time trend for average of intangible and tangible investment. Dependent variables are annual averages for intangible and tangible investment. All dependent variables are scaled by average assets. *EW* is equally-weighted average of investment and *VW* is average asset-weighted average of investment. *Intang* is the sum of R&D and advertisement expenditure and *Capex* is capital expenditure. Both *Intang* and *Capex* are scaled by average total assets (*AveAsset*). *Time* is a time trend variable defined as number of years since 1964 divided by 100.

Table 3 - Accrual and cash flows association for high and low intangible firms

	(1)
Dependent Variable:	ACC/Ave Asset
CFO/Ave Asset	-0.51***
	(-20.65)
High Intang Indicator	-0.02***
	(-9.34)
CFO/Ave Asset * High Intang Indicator	0.20***
	(9.17)
Observations	184,450
R-squared	0.41
Firm&Year FEs	Yes
Firm&Year Cluster	Yes

Ave Asset is average total assets, *Ave MV* is the average equity market value, *CFO* is cash flows, and *ACC* is accruals. *High Intangible Indicator* equal one for firm-years with intangible expenditure above the median, where intangible expenditure is the sum of research and development expenditure and advertisement expenditure scaled by average assets. All continuous variables are winsorized at the 1% and 99% levels and are defined in the Variable Appendix. *,**,*** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed t-test.

Table 4 - Accrual and cash flows association

Dependent Variable:	(1) $\frac{ACC}{AveAsset}$	(2) $\frac{ModifiedACC}{AveAsset}$	(3) $\frac{ACC}{AveMV}$	(4) $\frac{ModifiedACC}{AveMV}$
CFO/Ave Asset	-0.38***			
	(-13.26)			
Modified CFO/Ave Asset		-0.43***		
		(-16.52)		
CFO/Ave MV			-0.82***	
			(-21.13)	
Modified CFO/Ave MV				-0.94***
				(-21.37)
Observations	184,450	184,450	184,450	184,450
R-squared	0.41	0.51	0.45	0.50
Firm&Year FEs	Yes	Yes	Yes	Yes
Firm&Year Cluster	Yes	Yes	Yes	Yes

Ave Asset is average total assets, *Ave MV* is the average equity market value, *CFO* is cash flows, and *ACC* is accruals. *Modified CFO* and *Modified ACC* are cash flows and accruals that are modified for intangible investments, respectively. Modified variables are modified assuming that intangible investments are capitalized and amortized over five years. All continuous variables are winsorized at the 1% and 99% levels and are defined in the Variable Appendix. *,**,*** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed t-test.

Table 5 - Numerator adjustments

Panel A: Annual regression

	(1)	(2)
Dependent Variable:	$\beta\{CFO/Ave\ Asset\}$	$\beta\{Modified\,CFO/Ave\ Asset\}$
Time	1.86***	1.46***
	(21.22)	(19.92)
Constant	-0.81***	-0.74***
	(-30.63)	(-33.63)
Observations	53	53
R-squared	0.90	0.89

Panel B: Pooled regression

	(1)	(2)
Dependent Variable:	CFO/ Ave Asset	Modified CFO/Ave Asset
CFO/Ave Asset	-0.85***	
	(-27.45)	
Modified CFO/Ave Asset		-0.81***
		(-36.30)
CFO/Ave Asset * Time	1.48***	
	(15.20)	
Modified CFO/Ave Asset * Time		1.25***
		(16.75)
Observations	184,450	184,450
R-squared	0.43	0.52
Firm&Year FEs	Yes	Yes
Firm&Year Cluster	Yes	Yes

$\beta\{CFO/Ave\ Asset\}$ is the coefficient estimate from the model $ACC/Ave\ Asset_i = \alpha + \beta CFO/Ave\ Asset_i + e_i$ estimated annually and $\beta\{Modified\,CFO/Ave\ Asset\}$ is the coefficient estimate from the model $Modified\,ACC/AveAsset_i = \alpha + \beta Modified\,CFO/Ave\ Asset_i + e_i$ estimated annually. $Ave\ Asset$ is average total assets, CFO is cash flows and ACC is accruals. $Modified\,CFO$ and $ModifiedACC$ are cash flows and accruals that are modified for intangible investments, respectively. Modified variables are modified assuming that intangible investments are capitalized and amortized over five years. $Time$ is a time trend variable defined as number of years since 1964 divided by 100. All continuous variables are winsorized at the 1% and 99% levels and are defined in the Variable Appendix. *,**,*** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed t-test.

Table 6 - Denominator adjustments

Panel A: Annual regression

Dependent Variable:	(1) $\beta\{CFO/Ave\ Asset\}$	(2) $\beta\{CFO/Ave\ MV\}$	(3) $\beta\{CFO\}$
Time	1.86***	0.60***	-0.19***
	(21.22)	(2.96)	(-2.71)
Constant	-0.81***	-0.88***	-0.44***
	(-30.63)	(-14.46)	(-20.91)
Observations	53	53	53
R-squared	0.90	0.15	0.13

Panel B: Pooled regression

Dependent Variable:	(1) ACC/Ave Asset	(2) ACC/Ave MV	(3) ACC
CFO/Ave Asset	-0.85***		
	(-27.45)		
CFO/Ave MV		-0.83***	
		(-13.69)	
CFO			-0.14
			(-1.03)
CFO/Ave Asset * Time	1.48***		
	(15.20)		
CFO/Ave MV * Time		0.00	
		(0.02)	
CFO * Time			-0.66**
			(-2.39)
Observations	184,450	184,450	184,450
R-squared	0.43	0.45	0.81
Firm&Year FEs	Yes	Yes	Yes
Firm&Year Cluster	Yes	Yes	Yes

$\beta\{CFO/Ave\ Asset\}$ is the coefficient estimate from the model $ACC/Ave\ Asset_i = \alpha + \beta CFO/Ave\,Asset_i + e_i$ estimated annually; $\beta\{CFO/Ave\,MV\}$ is the coefficient estimate from the model $ACC/Ave\,MV_i = \alpha + \beta CFO/Ave\,MV_i + e_i$ estimated annually; and $\beta\{CFO\}$ is the coefficient estimate from the model $ACC_i = \alpha + \beta CFO_i + e_i$ estimated annually. $Ave\,Asset$ is average total assets, $Ave\,MV$ is the average equity market value, CFO is cash flows, and ACC is accruals. $Time$ is a time trend variable defined as number of years since 1964 divided by 100. All continuous variables are winsorized at the 1% and 99% levels and are defined in the Variable Appendix. *,**,*** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed t-test.

Table 7 - Numerator and denominator adjustments

Panel A: Annual regression

	(1)	(2)	(3)
Dependent Variable:	$\beta\{CFO/Ave\,Asset\}$	$\beta\{Modified\,CFO/Ave\,MV\}$	$\beta\{Modified\,CFO\}$
Time	1.86***	0.02	-0.38***
	(21.22)	(0.10)	(-5.83)
Constant	-0.81***	-0.84***	-0.42***
	(-30.63)	(-12.97)	(-21.60)
Observations	53	53	53
R-squared	0.90	0.00	0.40

Panel B: Pooled regression

	(1)	(2)	(3)
Dependent Variable:	ACC/Ave Asset	Modified ACC/Ave MV	Modified ACC
CFO/Ave Asset	-0.85***		
	(-27.45)		
Modified CFO/Ave MV		-0.75***	
		(-13.30)	
Modified CFO			-0.00
			(-0.02)
CFO/Ave Asset * Time	1.48***		
	(15.20)		
Modified CFO/Ave MV * Time		-0.73***	
		(-3.10)	
Modified CFO * Time			-1.14***
			(-4.00)
Observations	184,450	184,450	184,450
R-squared	0.43	0.50	0.87
Firm&Year FEs	Yes	Yes	Yes
Firm&Year Cluster	Yes	Yes	Yes

$\beta\{CFO/Ave\ Asset\}$ is the coefficient estimate from the model $ACC/Ave\ Asset_i = \alpha + \beta CFO/Ave\ Asset_i + e_i$ estimated annually; $\beta\{Modified\,CFO/Ave\,MV\}$ is the coefficient estimate from the model $Modified\,ACC/Ave\,MV_i = \alpha + \beta Modified\,CFO/Ave\,MV_i + e_i$ estimated annually; $\beta\{ModifiedCFO\}$ is the coefficient estimate from the model $ModifiedACC_i = \alpha + \beta ModifiedCFO_i + e_i$ estimated annually. $Ave\,Asset$ is average total assets, $Ave\,MV$ is the average equity market value, CFO is cash flows, and ACC is accruals. $Modified\,CFO$ and $Modified\,ACC$ are cash flows and accruals that are modified for intangible investments, respectively. Modified variables are modified assuming that intangible investments are capitalized and amortized over five years. $Time$ is a time trend variable defined as number of years since 1964 divided by 100. All continuous variables are winsorized at the 1% and 99% levels and are defined in the Variable Appendix. *,**,*** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed t-test.

Table 8 - Accrual and cash flows association for high and low intangible firms after numerator and denominator adjustments

	(1)
Dependent Variable:	Modified ACC/Ave MV
Modified CFO/Ave MV	-0.91***
	(-18.43)
High Intang Indicator	0.06***
	(7.01)
Modified CFO/Ave MV * High Intang Indicator	-0.07*
	(-1.90)
Observations	184,450
R-squared	0.50
Firm&Year FEs	Yes
Firm&Year Cluster	Yes

Ave Asset is average total assets, *Ave MV* is the average equity market value, *CFO* is cash flows, and *ACC* is accruals. *High Intangible Indicator* equal one for firm-years with intangible expenditure above the median, where intangible expenditure is the sum of research and development expenditure and advertisement expenditure scaled by average assets. *Modified CFO* and *Modified ACC* are cash flows and accruals that are modified for intangible investments, respectively. Modified variables are modified assuming that intangible investments are capitalized and amortized over five years. All continuous variables are winsorized at the 1% and 99% levels and are defined in the Variable Appendix. *,**,*** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed t-test.

Table 9 - Alternative explanations

Panel A: Loss and gain firms

	(1)	(2)	(3)	(4)
Dependent Variable:	Gain Firms	Loss Firms	Gain Firms	Loss Firms
CFO/Ave Asset	-0.93***	-0.73***		
	(-94.20)	(-15.22)		
CFO/Ave Asset * Time	0.59***	1.03***		
	(15.73)	(8.08)		
Modified CFO/Ave MV			-0.88***	-0.63***
			(-49.51)	(-5.76)
Modified CFO/Ave MV * Time			-0.01	-1.29***
			(-0.13)	(-3.61)
Observations	129,120	55,330	129,120	55,330
R-squared	0.79	0.45	0.83	0.59
Firm&Year FEs	Yes	Yes	Yes	Yes
Firm&Year Cluster	Yes	Yes	Yes	Yes

Panel B: Low and high one-time and nonoperating items firms

	(1)	(2)	(3)	(4)
Dependent Variable:	SI Below Median	SI Above Median	SI Below Median	SI Above Median
CFO/Ave Asset	-0.92***	-0.83***		
	(-44.10)	(-22.35)		
CFO/Ave Asset * Time	1.32***	1.49***		
	(19.79)	(13.40)		
Modified CFO/Ave MV			-0.86***	-0.70***
			(-31.26)	(-10.21)
Modified CFO/Ave MV * Time			-0.02	-0.93***
			(-0.16)	(-3.51)
Observations	92,225	92,225	92,225	92,225
R-squared	0.64	0.46	0.68	0.53
Firm&Year FEs	Yes	Yes	Yes	Yes
Firm&Year Cluster	Yes	Yes	Yes	Yes

Ave Asset is average total assets, *Ave MV* is the average equity market value, *CFO* is cash flows, and *ACC* is accruals. *Modified CFO* and *Modified ACC* are cash flows and accruals that are modified for intangible investments, respectively. Modified variables are modified assuming that intangible investments are capitalized and amortized over five years. *Time* is a time trend variable defined as number of years since 1964 divided by 100. *Loss Firms* (*Gain Firms*) sample includes firms with negative (non-negative) earnings before extraordinary items. *SI Below Median* (*SI Above Median*) sample includes firms whose one-time and nonoperating items are below (Above) the median, where one-time and nonoperating items is the absolute value of the difference between operating income after depreciation and pretax income scaled by average total assets. All continuous variables are winsorized at the 1% and 99% levels and are defined in the Variable Appendix. *,**,*** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed t-test.