How Do Accruals Differ for Physical versus Knowledge Firms?

Aneel Iqbal

Haskayne School of Business, The University of Calgary

Anup Srivastava

Haskayne School of Business, The University of Calgary

ABSTRACT

The principles of accrual accounting took shape when firms principally operated with physical assets and largely produced physical products (physical firms). The global economy in general, and the US economy in particular, has shifted towards firms that operate with homebuilt intangible assets and sell instantaneously produced services (knowledge firms; for example, Google and Facebook). In this paper, we examine the differences in amounts, properties (quality, persistence, and the ability to predict future cash flows), and composition of accruals for knowledge versus physical firms. We find that accruals of knowledge firms are smaller in magnitude, have better quality, are more persistent, and are more predictive of future cash flows, than for physical firms. Our study shows that the accounting for knowledge-intensive firms requires lesser judgment; yet, the quality and usefulness of accrual accounting is no different, or, in some instances, even better than that of physical firms. Our study contributes to the contemporary debate on the usefulness of accrual accounting vis-à-vis cash accounting, as the composition of listed firms shifts towards knowledge firms. We show that accrual accounting remains useful despite this shift.

Keywords:

Accruals, Intangibles, Earnings Quality, Timing Roles, Summary Measure

JEL Classifications:

C52; G14; M41

1 Introduction

Accruals distinguish modern accounting from mere counting of cash (Dechow, Kothari, and Watts 1998). Judgment is required to calculate almost every item in financial statements. A vast body of research documents that earnings, the outcome of accounting judgment and accrual accounting, is a better measure of performance for valuation and compensation- and debt-contracting than cash accounting (e.g., Dechow 1994; Dechow et al. 1998; Liu, Nissim, & Thomas 2002).

The principles of accrual accounting took shape when firms principally operated with physical assets and largely produced physical products. Therefore, the concepts that are hallmarks of accrual accounting, such as accumulating costs in the form of property, plant, and equipment (PP&E) and inventory, recognition of revenues and cost of goods sold (COGS) upon the delivery of a product, and recognizing other costs as expenses over predetermined periods, apply well to firms that produce physical products and operate with physical assets. But how do the accrual concepts apply to firms that operate principally with knowledge assets, built with expensed-as-incurred costs, and sell services that are instantaneously produced and sold? These businesses mainly transform "information from one pattern into another," unlike physical-intensive industries that transform "matter and energy from one form into another" (Karmarkar and Apte 2008, p.15). This question is important because intangible-intensive firms that sell services, such as Microsoft, Facebook, Netflix, Amazon, and Alphabet, now dominate the private-sector economy both numerically and by market capitalization.[1]

Prior literature examines how the changing characteristics of firms, particularly the growth in prominence of intangible-intensive firms, explain the bulk of temporal changes in earnings

[1] In 2019, firms listed after 1990 were 60% numerically and 89% by market capitalization.

properties, documented by Lev and Zarowin (1999), Collins, Maydew, & Weiss (1997), and Dichev & Tang (2008). For example, Srivastava (2014) finds that the change in sample composition towards knowledge-intensive firms is one of the principal factors for the decrease in the relevance of earnings and the matching between revenues and expenses.[2] However, no prior study presents a systematic comparison between the amounts, components, and properties of accruals for intangible-intensive versus physical-intensive firms. This approach to study the properties of accruals at the component level has a potential for broader applications in accounting and capital markets research.

In this paper, we examine the differences in amounts, components (working capital, long-term, conditionally conservative, non-articulating, and financial), and properties (correlation with current cash flows, quality, persistence, and ability to predict future cash flows) of accrual components of knowledge versus physical firms. We identify the two categories of firms by the top and bottom quartiles of SG&A scaled by total assets (SG&A intensity). Corrado et al. (2005) categorize intangible investments into three groups: computerized information (computer programs and computerized databases), innovation (scientific R&D and nonscientific discovery and development), and economic competencies (knowledge embedded in firm-specific human and structural resources, such as brand names. Such intangible investments are reported in the SG&A expenses (Lev and Radhakrishnan 2005; Banker, Huang, and Natarajan. 2011; Eisfeldt and Papanikolaou 2013; Enache and Srivastava 2018). We use a sample of 135,125 firm-year observations from 1990 to 2018, ignoring the observations in the middle two quartiles of SG&A

[2] Bushman, Lerman, and Zhang (2016), Christensen, D'Adduzio, and Nelson (2019), Dai, Patatoukas, Thomas and Zhang (2020), however, reach contrasting conclusions about decline in accrual quality and whether change over time in average accrual properties is related to changing firm sample.

intensity.[3][4] For our initial tests, we identify the two categories of firms matched in time. That is, firms in the top and bottom quartiles in each year by SG&A intensity are treated as knowledge and physical firms, respectively. In additional tests, we classify firms matched by industry (Fama and French 1997) and stages of lifecycle (Dickinson 2011). That is, firms in each industry and lifecycle are divided into quartiles by industry or lifecycles, and the top and the bottom quartiles are considered knowledge and physical firms, respectively.

While the difference in the amounts of accruals for the two types of firms is predictable, the literature does not provide guidance for the differences in their properties of accruals. Hence, instead of formulating hypotheses, we perform exploratory analysis using an inductive approach following Allee and Yohn (2009), Esplin, Hewitt, Plumlee and Yohn (2014), and Enache and Srivastava (2018). Inductive research presents broader observations and identifies relations and patterns which facilitate theory building and specific hypotheses testing in subsequent research. We test our conclusions through cross-sectional analyses and discuss the potential consequences of these differences.

We follow Larson, Sloan, and Giedt (2018) to measure accruals in a more comprehensive manner than most prior studies, by subtracting changes in cash and cash equivalents from changes in common stockholders' equity. We divide comprehensive accruals into working capital, long-term, conditionally conservative, non-articulating, and financial accruals. The working capital accrual is the net impact of changes in accounts receivable, inventory, and accounts payable. Long-term accrual is largely depreciation and change in deferred taxes. Conditionally conservative

[3] We show that classification by SG&A intensity is significantly similar to those based on R&D intensity and market-to-book ratio. We do not use R&D as a classifier for our main tests because a large sample of firms report zero R&D (Koh and Reeb 2015). In certain industries, almost all firms report zero R&D, precluding us from conducting industry-level tests.

[4] We need cashflow data from prior year to calculate accrual quality, which are available only from 1989.

accrual captures the effect of conservative accounting which requires net assets to be written down when their carrying value goes below book value but not the other way round. This accrual results from accounting rules such as lower-of-cost-or-market accounting for inventories (FASB: ASC 330), the requirement for goodwill impairments (FASB: ASC 350), and long-term asset write-downs (FASB: ASC 360). Non-articulating accruals arise from "non-articulating" events, such as non-cash acquisitions, divestitures, and foreign currency translation adjustments.[5] Financial accrual includes changes in investment, debt, and equity accounts that do not appear in changes in common equity account.[6]

As expected, we find that the average accruals of knowledge firms (0.126) is significantly smaller than, and less than a quarter in magnitude, than those of physical firms (0.531). To the extent that the magnitude of accruals represents the discretion or judgment required in financial reporting, the difference indicates that accounting judgment plays a smaller role in financial reporting of knowledge firms.

We next examine the difference in components of accruals. If most of the investment outlays are expensed as incurred, then one of the biggest judgments in accounting, the capitalization of long-term investments, applies to a smaller extent to knowledge firms. Therefore, the greatest difference between magnitude of accruals of the two categories of firms is caused by long term accruals (0.341 vs. 2.490), as most of the key long-term resources developed in-house by knowledge firms are intangible in nature and are not allowed to be capitalized under the U.S.

[5] These are called non-articulating events because they cause a difference between accruals measured using the balance sheet and accruals measured using the statement of cash flows.

[6] For example, if the working capital is financed through a short-term loan, this increase in loan will result in a negative financial accrual, without any changes in the cash account. As another example, from the perspective of common equity holders, the issuance of preferred equity would result in a negative financial accrual since it will increase cash flows without any changes in the common equity account.

GAAP. The difference in long-term accruals for the two types of firms (2.149) is both economically and statistically significant.

The conditionally conservative accruals are smaller for knowledge firms (−0.212 vs. −0.576) as a large portion of their intangible assets developed in-house are not recognized on the balance sheet and, therefore, do not require a subsequent write-off. Surprisingly, even the non-articulating accruals, that arise largely from acquisitions, are smaller in magnitude for knowledge firms (−0.007 vs. −0.739). Arguably, many knowledge firms grow by acquisitions than by organic growth. The financial accruals are smaller for knowledge firms (−0.045 vs. −0.736) as their working capital (and other assets) is typically financed through equity instead of debt which does not give rise to financial accruals.[7]

Dechow and Dichev (2002), hereafter DD, argue that accrual accounting requires multiple estimates and is prone to errors. They develop a measure that captures the extent to which accruals map into the past, present, and future cash flow realizations. In this model, the residuals, which represent the accruals that are unrelated to cash flow realizations, is a proxy for estimation errors, and its magnitude is considered an inverse measure of accrual quality. Using the DD model (modified by Francis and Smith 2005), we find that the root mean squared error (RMSE) of the DD model is 31% lower in the case of knowledge firms (0.95) as compared to physical firms (1.38). This means that the accruals of knowledge firms have fewer estimation errors as compared to physical firms.

Dechow (1994) points out that the timing role of accrual accounting results in a negative correlation between contemporaneous accruals and cash flows. For example, an unexpected demand increases earnings in the current period but decreases cash flows because of the

[7] If the working capital is financed through a loan, it will result in an increase in financial accrual as it represents all changes in all investment accounts, all debt accounts, and all equity accounts other than common equity.

requirement to buy additional inventory compounded by delayed cash receipts that spill into next fiscal year. This reduced operating cash flows, but increased working capital accruals, results in a negative association between accruals and contemporaneous cash flows. The magnitude of negative association in the DD model, measures the smoothing role of accruals and is considered a measure of accrual quality (Dechow et al. 1998; Bushman, Lerman, and Zhang 2016). We find that the negative association between accruals and contemporaneous cash flows in the DD model is significantly larger for knowledge firms (−0.107) than for physical firms (−0.052).[8] The two tests using the DD model, the magnitude of residual errors and the degree of negative association, show that while the magnitude of accruals is smaller for knowledge firms, accruals perform their smoothing role more effectively for knowledge firms than for physical firms.

The persistence of earnings is an important property for equity valuation models, because it improves the reliability of forecasts of future firm performance (Dechow, Ge, and Schrand 2010). Accruals, as a component of earnings, is however less persistent than the cash flows, thus, it lowers earnings persistence (Sloan 1996). We estimate the difference in persistence of accruals for knowledge and physical firms. We follow Sloan (1996) to regressing the one-year ahead income on current cash flows and accruals. The coefficient on accruals called persistence in Sloan (1996), is 0.460 for knowledge firms, and is significantly higher than 0.396 for physical firms. We also estimate the same model with accrual components instead of total accruals. Most of the accrual components present the same pattern, that is, they have higher factor loadings for knowledge firms. Overall, the results show that accrual and its components are significantly more persistent for knowledge firms than for physical firms.

[8] The negative association is also related to the length of operating cycle. It is not a plausible explanation because working capital cycle of knowledge firms, devoid of inventory, is unlikely to be longer than that of physical firms, on average.

We next examine the usefulness of accruals in predicting future cash flows. We estimate the adjusted *R-square* of the regression of the one-period-ahead cash flows on current cash flows and accrual components, following Barth, Cram, and Nelson (2001). We find that the coefficients on accrual components and the adjusted *R-square* of the regression are significantly higher for knowledge firms as compared to physical firms.

Taken together, we find that, compared to physical firms, the accruals of knowledge firms are smaller in magnitude, show a significantly more negative association with contemporaneous cash flows, have better proxies of quality, are more persistent, and are more predictive of future cash flows. Our findings are important because they broaden the literature's understanding of how knowledge intensity impacts the role of accruals in the summary measure of firm performance. We respond to a call by Larson et al. (2018), who encourage researchers to study how the properties of accruals are related to firms' economic characteristics.

Compared to cash accounting, accruals-based accounting is more useful for valuation (Ball 2001) and contract settlement (Watts and Zimmerman 1986). Nevertheless, management biases (Rogers & Stocken, 2005), opportunistic accounting (Jones 1991), estimation errors (Dechow & Dichev 2002), and wrongful subjective judgments (Gong et al. 2009) can reduce the usefulness of accounting and mislead users of financial statements. Therefore, society and the owners of public firms spend considerable resources on the preparation and auditing of financial statements (Ball 2001). Our paper contributes to the discussion on changes in the usefulness of accrual accounting as the composition of listed firms shifts towards knowledge-intensive firms (for example, Nallareddy, Sethuraman, and Venkatachalam 2020; Christensen, D'Adduzio, and Nelson 2019). Our paper adds to this discussion by improving the understanding of the magnitude, composition, and properties of accruals for a set of firms that increasingly dominate the economy.

The remainder of the paper is organized as follows. Section 2 summarizes the prior literature and motivation for the research, Section 3 describes the measurement of accrual components and the choice of scaling variable, Section 4 provides the details of sample selection, Section 5 explains the measurement of knowledge intensity and provides descriptive analyses, Section 6 contains the analyses of accrual properties, Section 7 performs additional tests at industry level, and Section 8 concludes.

2 Prior Literature and Motivation

In this section, we summarize prior literature on the definition and importance of accrual accounting:

2.1 Accruals accounting

The accruals process is at the heart of accounting. Accrual accounting recognizes the impact of economic events in the life of a firm irrespective of the timing of cash flows associated with those events. The contrast between cash- and accrual-based accounting is highlighted in FASB Concept No. 8 (paragraph OB17):

Accrual accounting depicts the effects of transactions, and other events and circumstances on a reporting entity's economic resources and claims in the periods in which those effects occur, even if the resulting cash receipts and payments occur in a different period.

Revenue recognition and matching are the two guiding principles that give rise to the need for accruals. Revenue is recognized when the firm has performed its obligations and the associated cash receipts are reasonably certain. The matching principle requires that the outlays associated with revenues are recognized as expenses in the same period as the period in which the firm recognizes the revenue. In addition, the timing of cash flows does not always match with their economic consequences, and the mismatch depends on a firm's stage in its lifecycle. For example,

at the start of the lifecycle, the firm buys long-term assets that require an immediate cash outflow. However, the economic benefits of these assets occur over several years. To account for this mismatch between cash flows and economic benefits, firms capitalize the outlays on PP&E as long-term assets on the balance sheet and recognize their costs over their estimated useful lives through depreciation. This typically results in one of the largest accruals components.

After the firm starts operating, it buys raw materials on credit leading to account payables. The manufacturing cycle leads to work-in-progress and finished goods that are capitalized as inventory. The finished products/merchandise could then be sold in the next period, causing a mismatch between the incurrence of costs and the timing of the sale. In addition, cash for purchases may be paid before or after the materials or services are received, leading to prepaid assets or accounts payables. Furthermore, firms may receive cash before delivering goods and services, or afterward, leading to deferred revenues and accounts receivable. Working capital accruals ameliorate the mismatches between cash inflows and outflows and related economic events.

In addition to the timing role of accruals, the other important role recognized in the literature is the recognition of losses in an asymmetric timely manner (Basu 1997; Ball and Shivakumar 2006). Due to the application of the conservatism principle, a firm needs to write-off the value of assets (for example, when the net realizable value or fair goes below the recorded value). These accruals are always negative as they decrease the net income without affecting cash flows.

Some accruals are non-articulating as they only impact the balance sheet without appearing in the cash flow statement. For example, the increases in accounts receivable in the balance sheet that are the result of an acquisition will not be reflected in changes in accounts receivable reported in the statement of cash flows.

Accruals distinguish modern accounting from mere counting of cash (Dechow, Kothari, and Watts 1998). A vast body of research documents that earnings are a better measure of performance for valuation, compensation, and debt contracting than the underlying cash flows (e.g., Dechow 1994; Dechow, Kothari, and Watts 1998; Liu, Nissim, and Thomas 2002).

Various explanations for the prominence of accounting earnings and the reasons for its usage have been offered. One explanation is that earnings better predicts cash flows (Dechow 1994) and has a higher correlation with returns than do current cash flow (e.g., Watts 1977; Dechow 1994). This can help explain why earnings are often used instead of operating cash flows in valuation models and performance measures.

2.2 Properties of Accruals

In this subsection, we discuss certain properties of accruals relevant to our research question. For example, on one hand, Dechow (1994) and Dechow et al. (1998) argue that accruals reduce the noise in operating cash flows that arise from variations in firms' working capital levels and therefore provide a better measure of firm performance. Accordingly, as noted earlier, accruals are a better predictor of cash flows and are better associated with the current stock prices than are cash flows (Dechow 1994). Furthermore, both differential characteristics vis-à-vis cash flows are related to the length of the operating cycle. On the other hand, Sloan (1996) shows that the accrual component of earnings has lower persistence than cash flows and that the investors fail to fully recognize this difference. Hao (2009) shows the differential persistence of accruals is attributable to the length of the operating cycle.

Another stream decomposes accruals into its components and explores the incremental information content from such disaggregation. For example, Barth et al. (2001) show that accrual components differ in their ability to predict future cash flows, thus, disaggregating accruals

improves earnings' ability to forecast cash flows. Jones (1991) divides accruals into discretionary and non-discretionary accruals to estimate the earnings that would have been reported in the absence of accounting manipulation. She suggests that the judgment and estimates inherent in accrual estimates can be used for opportunistic reporting. Some other examples of accrual decomposition are reliable vs. unreliable (Richardson et al., 2005), growth vs. efficiency (Richardson et al., 2006), and growth vs. matching (Allen et al., 2013).

A recent stream discusses the changes in the properties of earnings (and its accrual and cash flow components) that are associated with the changes in the real economy. For example, Bushman et al. (2016) show that the negative correlation between accruals and cash flows, a property that makes the accruals perform their smoothing role, has decreased dramatically in magnitude over the past 50 years and has largely disappeared. Nallareddy et al. (2020) find that the earnings' ability to predict future cash flows increased over the period 1989-2015, but largely due to changes in the operating environment rather than accrual properties. Christensen et al. (2019) find that the long-term trend of declining accruals quality began to reverse around 2000, with accruals quality generally improving through 2016. They attribute this pattern to the economic (cash flow) uncertainty of the firm's operating environment. Our paper is related to this stream of literature.

3 Measurement of Accruals

Although extensive research has been conducted on accrual accounting, there exists no universally accepted method for the measurement of accruals (Larson et al. 2018). Early accrual models focused on the balance sheet-based method in the absence of the cash flow statement. In addition, those studies focused on working capital accruals, because they are more suitable for examining the time-series properties of annual earnings and predictability of future cash flows (Larson et al. 2018; Richardson et al. 2005). Non-current accruals, which could be larger than

working capital accruals, were largely omitted from these models because most studies focused on the timing role of accruals spanning less than two years or working capital cycles. Relying on the balance sheet method could result in noisy measures of accruals and cash flows (Collins and Hribar 2002; Richardson et al. 2005; Larson et al. 2018). Thus, it is important to clarify the concept and measurement of accrual (Ohlson, 2014). Larson et al. (2018) provide a comprehensive definition of accruals and a parsimonious model that combines and expands prior accrual models. They recommend examining a comprehensive measure of accruals unless there are specific reasons for focusing on a particular category of accruals. We follow Larson et al. (2018) method in this paper.

3.1 Accrual Components

Following Larson et al. (2018), we measure comprehensive accruals (*ComprehensiveAccruals*) by subtracting changes in cash and cash equivalents from changes in common stockholders' equity. Intuitively, this means that *ComprehensiveAccruals* represents all transactions that affect the book value of shareholder equity but are not reflected in changes in cash.

We then follow the decomposition of accruals into five components, as proposed by Larson et al. (2018), and presented in the following equation:

$$ComprehensiveAccruals_{i,t} = WorkCap_{i,t} + LongTerm_{i,t} + CondConserv_{i,t} + NonArticulating_{i,t} + Finacial_{i,t}. \quad (1)$$

where *WorkCap* denotes working capital accruals, *LongTerm* denotes long-term accruals, *CondConserv* denotes conditionally conservative accruals, *NonArticulating* denotes non-articulating accruals, and *Financial* denotes financing accruals. We provide an intuitive explanation of each of these components below and a detailed explanation of COMPUSTAT variables used in their measurement in Appendix A.

3.1.1Working Capital Accruals

The working capital accruals (*WorkCap*) arises from changes in accounts receivable, inventory, and accounts payable. These operating accruals are short-term in nature and are typically expected to reverse (at the transaction level) within a year. Working capital accruals reduce the impact of fluctuation in the operating cash flows that arise from exogenous or manipulative variation in firms' working capital levels (Dechow 1994; Dechow, Kothari, and Watts 1998; Guay, Kothari, and Watts 1996).

3.1.2 Long Term Accruals

Long term accruals (*LongTerm*), such as depreciation and the change in deferred taxes, mitigate timing problems that are of a longer duration. (refer to Section 2.1 for a discussion on timing problem and accruals' role in its mitigation). At the start of the lifecycle, the firm buys long-term assets that require an immediate cash outflow. However, the economic benefits of these assets occur over several years. To account for this mismatch between cashflows and economic benefits, firms capitalize the outlays on PP&E as long-term assets on the balance sheet and recognize their costs over their estimated useful lives through depreciation. This typically results in one of the largest accruals for physical firms. Deferred tax expense/revenue, another common long-term accrual, recognizes anticipated future tax outflows or benefits in the current period, thereby improving earnings as a performance measure (Guay & Sidhu, 2001).

3.1.3 Conditionally Conservative Accruals

These accruals capture the effect of conditionally conservative accounting, which requires that net assets be written down when their carrying value exceeds certain thresholds (*CondConserv*). As a result, firms are required to recognize in the current period the expected future losses when those losses become probable. In contrast, the expected future gains are not recognized in the current

period. For example, if the value of inventories declines below their historical costs, the firm is required to recognize an unrealized holding loss equal to the difference between its inventory's historical cost and market value. Ball and Shivakumar (2006) and Dechow and Ge (2006) show that this category of accruals has different properties (e.g. lower persistence, higher frequency in loss firms, etc.) than other operating accruals and should, therefore, be analyzed separately.

3.1.4 Non-Articulating Accruals

This category incorporates accruals arising from "non-articulating" events, such as non-cash acquisitions and divestitures and foreign currency translation adjustments (*NonArticulating*). These are called non-articulating events because they cause a difference between accruals measured using the balance sheet and accruals measured using the statement of cash flows. For example, increases in accounts receivable in the balance sheet that are the result of an acquisition will not be reflected in changes in accounts receivable reported in the statement of cash flows.

3.1.5 Financial Accruals

This category includes all changes in investment accounts, debt accounts, and equity accounts other than common equity (*Financial*). For example, financing of working capital through a long-term loan increases working capital, resulting in a positive working capital accrual, and also increases the short-term debt, resulting in a negative financial accrual, but there is no change in the cash account.

3.2 Deflator for Accruals

Accruals need to be scaled by a suitable deflator for comparing accruals of firms of different sizes and to estimate regressions. Prior studies typically use average total assets as the denominator for scaling accruals in their research. However, in a recent paper, Dai, Patatoukas, Thomas and Zhang (2020) argue that using assets as the deflator can lead to erroneous conclusions because

many new-economy firms have negative operating cash flows and low total assets. The negative operating cash flows result from large expenditures on intangibles that are treated as operating cash flows instead of investing cash flows. Furthermore, these firms typically have low assets as their main investments, in technology and soft assets, are expensed immediately according to current U.S. GAAP. Scaling by low amount of assets can lead to outliers in accrual measures, as well as their being highly influential observations. One way to solve this data problem is to delete observations with negative cash flows and low assets. Deleting these observations, however, eliminates a substantial and increasingly important fraction of knowledge firms. Based on this analysis, Dai et al (2020) propose using the number of shares as a deflator. Also, analyst reports of earnings and cash flows are typically on a per-share basis. Following Dai et al (2020), we use the number of common shares to scale the variables in our analyses.

4 Sample selection

Table 1 summarizes sample selection. Because the statement of cash flows was not adopted until 1989, we begin sampling from 1990 (to allow for lagged operating cash flow). We obtain financial statement data and stock return data from COMPUSTAT. Following prior research, we drop financial services companies (SIC 6000–6999) and limit the sample to U.S. domestic firms. We also delete all observations where comprehensive accruals, accrual components, net income, sale, or total assets are missing for the current year *t* or cash flows are missing from years *t−1* to *t+1*. Our sample consists of 135,125 firm-year observations (14,659 unique firms) from the year 1990 to 2018. We winsorize all variables at the 1 and 99 percent level to mitigate the effect of outliers, similar to prior studies (Larson et al. 2018).

Table 2 presents the univariate analysis of accrual components. Average total accruals (*ComprehensiveAccruals*) are positive (0.377) primarily due to the large positive (1.451) long-

term accruals (*LongTerm*). Working capital accruals (*WorkCap*) are positive (0.139) and is the smallest component in terms of its magnitude, even though it has been widely examined in prior studies. All the other components are negative on average. Conditionally conservative accruals (*CondConserv*) are negative on average (−0.405) with a maximum value of zero. The mean of non-articulating accruals (*NonArticulating*) is negative (−0.415). Financial accruals (*Financial*) are negative on average (−0.383). Using the median as an alternative measure of central tendency (untabulated) presents a similar picture.

5 Increasing Importance of Knowledge Assets and Measurement of Knowledge Intensity

5.1 Changes toward the knowledge economy

As a result of unprecedented technological development over the past 50 years, the global economy has moved from being primarily a capital-intensive economy to a more knowledge-based economy (Corrado & Hulten, 2010). In the modern economy, intangibles play an important role in the growth and competitive advantage. In particular, US firms have increased their investment in intangible capital such as innovation, advertising, information technology, human capital, and customer relations. This increase in intangible intensity has caused significant changes in the firms' business models, operating, investing, and financing decisions, volatility, and survival rates (Srivastava 2014; Corrado and Hulten 2010). In this study, we examine how the magnitude, composition, and properties of accruals differ for firms that rely principally on physical and knowledge assets.

5.2. Measuring knowledge intensity

There is no consensus in the literature about how to measure the knowledge intensity. While R&D is typically considered a proxy for intangible investments, a large percentage of firms report zero R&D (Koh and Reeb 2015; Enache and Srivastava 2018). In addition, many studies argue for a larger category of intangible investments that are typically reported in SG&A expenses

(Lev and Radhakrishnan 2005; Banker, Huang, and Natarajan. 2011; Eisfeldt and Papanikolaou 2013; Enache and Srivastava 2018). We start by calculating five different measures. These are selling, general and administrative expenses divided by total expenses (*SGA_Intensity_E)*, selling, general and administrative expenses divided by average total assets (*SGA_Intensity_A)*, R&D expenses divided by total expenses (*RD_Intensity_E)*, R&D expenses divided by average total assets (*RD_Intensity_A)* and the ratio of market value to book value of assets (*Market/Book Ratio)*. Table 3 presents the correlation between these measures and shows that they are significantly correlated with each other. For example, the correlation of *SGA_Intensity_E* with *SGA_Intensity_A, RD_Intensity_E* and *RD_Intensity_A* is 0.59, 0.21 and 0.26, respectively (*p*-value <0.01).

We then choose SG&A expenses divided by total assets (*SGA_Intensity*) as the main measure for our analyses to overcome the data limitations imposed by R&D measure. We rank all firms into quartiles ranked by *SGA_Intensity* and matched alternatively by year, industry, and stage of the life cycle. We call the top and bottom quartiles as knowledge and physical firms, respectively. We define industry by the Fama-French 48-industry classification (Fama and French 1997). We follow Dickinson (2011) to identify the various stages of a firm's life cycle (introduction, growth, maturity, and decline) by utilizing its cash flow patterns. We describe results by the classification matched in time, but we also present all results with industry and lifecycle classifications. In addition, we present results after excluding loss observations.

5.3 Univariate differences

We start our analyses of the differences in properties between knowledge and physical firms by comparing their key characteristics. Panel A of Table 3 shows that on average, knowledge firms are significantly smaller than physical firms as measured by their sales (642.9 million vs. 2,989.5

million), assets (334.9 million vs. 5,068.0 million), and market values (837.5 million vs. 6,555.6 million). The knowledge firms are also significantly less profitable on average as compared to physical firms (net income of 14.6 million vs 163.6 million) but have a significantly higher market to book value ratio (3.95 vs. 2.31). The average characteristics based on alternative matchings are largely similar.

6 Analyses of Accrual Properties

In this section, we explain how we measure the accrual properties and then discuss the differences in these properties between knowledge and physical firms.

6.1 Magnitude of accruals and its components

Table 5 shows the comparison of the means of accrual components between knowledge and physical firms. For expositional purposes, we present the means and medians of accrual components, which are negative on average as positive values, based on the idea that both negative and positive values require judgment, and that their magnitude represents the extent of judgment. Panel A of Table 5 shows that the means of magnitudes of all accrual components are significantly smaller for knowledge firms as compared to physical firms. The average *ComprehensiveAccruals* for knowledge firms is 0.126 which is less than a quarter of 0.531 for physical firms.[9] *WorkCap* is the smallest positive component of accruals with an average of 0.059 for knowledge firms as compared to 0.122 for physical firms. This indicates that knowledge firms operate with a much smaller working capital. *LongTerm* is the largest accrual component with an average of 0.341 for knowledge firms which is significantly smaller than 2.490 for physical firms. This is because in-house knowledge investments are largely expensed under the current accounting rules. *CondConserv* is always negative as explained in Section 3.1 with an average of −0.212 for

[9] The numbers discussed here are for the firms matched on time. The results matched by industry and stage of life cycle are largely similar, therefore not discussed for brevity.

knowledge firms as compared to −0.576 for physical firms. The magnitude is smaller for knowledge firms. One plausible reason is that, because most of their assets are intangible which are not recognized on the balance sheet, they do not have to write those assets off when their fair value decreases.

The average for *NonArticulating* accruals is −0.007 for knowledge firms as compared to −0.739 for physical firms. This is a surprising result because knowledge firms often rely on acquisitions to grow that typically result in non-articulating accruals. Finally, the average for *Financial* accrual for knowledge firms is −0.045 compared to −0.736 for physical firms. The magnitude is smaller for knowledge firms as their investments, to the extent capitalized, are financed through equity, and not debt, (Denis and McKeon 2016) which leads to financial accruals. We also present this analysis by knowledge and physical firms matched on industry and stage of the life cycle. We find largely similar patterns and therefore don't discuss them for brevity.

6.2 Measures of Accrual Quality

A major role of accrual accounting is to smoothen the temporary timing fluctuations in operating cash flows. Accruals also produce a less noisy measure of firm performance by adjusting for the exogenous or manipulative variation in working capital items such as inventory, prepayments, accounts receivable, and accounts payable. (Ball and Shivakumar 2006). Dechow (1994) argues that the central prediction of the timing role of accrual accounting, therefore accruals and cash flows from operations are negatively correlated.[10] Because this negative correlation occurs from accruals' role in mitigating the timing differences between earnings and cash flows,

[10] An unexpected increase in sales increases earnings but tends to decrease cash flows and generates an offsetting increase in accruals. The costs associated with sales increase, such as buying of inventory and raw material, need to be paid before the cash flows associated with increased sales arrive, and such timing differences increase in cash operating cycle. The resultant increase in inventory and accounts receivables increases working capital accruals, causing a negative contemporaneous association between cash flows and working capital accruals.

it is considered a proxy for accrual quality (Bushman et al. 2016). Following Bushman et al. (2016), we use the DD model, as modified by Francis et al. (2005), to estimate this negative association. We estimate the model separately for the knowledge and physical firms.

$$\Delta WorkCap_{i,t} = \alpha + \beta_1 CashFlow_{i,t-1} + \beta_2 CashFlow_{i,t} + \beta_3 CashFlow_{i,t+1} + \beta_4 \Delta PPE_{i,t} + \beta_5 \Delta SALE_{i,t} + \varepsilon_{i,t}. \quad (2)$$

A more negative β_2 in equation 2 implies a stronger negative association of working capital accruals with contemporaneous cash flows and better quality of accruals.

In Table 6, we present the results of the regression defined in equation 2. When matched on year, β_2 is more negative for knowledge firms as compared to physical firms (−0.107 as compared to −0.052) and the difference is statistically significant (*Chi-square* p-value <0.01). In the same table, we also present the same analysis by matching firms by industry and stage of the life cycle, and after excluding loss firms. β_2 is significantly more negative for knowledge firms as compared to physical firms in the alternative classifications.

The DD model provides another measure of accrual quality—it captures the extent to which accruals map into the past, present, and future cash flow realizations. Accruals that map more closely into cash flows are considered to be of higher quality (Dechow and Dichev 2002). The model residuals represent the accruals that are unrelated to adjacent-period cash flow realizations, and the standard deviation of these residuals is an inverse measure of accrual quality. The model focuses on working capital accruals only because DD (page 37) describes: "cash flow realizations related to working capital generally occur within one year, making both the theory and the empirics more tractable."

Table 6 presents the results of the regression presented in equation 2. Based on sample matched on time, the standard deviation of residuals (RMSE) of the regression is 0.95 for

knowledge firms which is 31.2% lower than 1.38 for physical firms. The results are consistent in Panel B, C, and D which show the analyses based on rankings of knowledge intensity within the industry, stage of the life cycle, and after excluding loss firm-years respectively. This provides further evidence that knowledge firms have better quality accruals as compared to physical firms, on average.

6.3 Persistence

The persistence of earnings represents a more sustainable stream that will make earnings more useful for equity valuation models based on discounted cash flows (Dechow, Ge, and Schrand 2010). The persistence of accruals is however lower than cash flows (Sloan 1996), attributable to three factors.[11] We measure the persistence of accruals by regressing one-year ahead income on current year cash flows and accruals following Sloan (1996).

$$Earnings_{i,t+1} = \alpha + \beta_1 CashFlow_{i,t} + \beta_2 ComprehensiveAccruals_{i,t} + \varepsilon_{i,t}. \quad (3)$$

The persistence of accruals is measured by β_2. We also estimate the same model by using accrual components instead of *ComprehensiveAccruals*.

$$Earnings_{i,t+1} = \alpha + \beta_1 CashFlow_{i,t} + \beta_2 WorkCap_{i,t} + \beta_3 LongTerm_{i,t} + \beta_4 CondConserv_{i,t} + \beta_5 NonArticulating_{i,t} + \beta_6 Financial_{i,t} + \varepsilon_{i,t}. \quad (4)$$

To compare the difference between the persistence of accruals and its components of knowledge and physical firms, we perform a *Chi-square* test and measure the significance of differences in the coefficients of *ComprehensiveAccruals* and its components.

Table 7 tabulates the results of the regressions presented in equation (3). For year-matched sample, the coefficient on *ComprehensiveAccruals* is 0.460 for knowledge firms which is

[11] The first explanation is that the measurement process of accruals is less reliable than cash flows (Sloan, 1996). The second explanation is that accruals arise from organic growth which mean reverts (Fairfield et al., 2003). The third explanation is that accruals could be a result of "artificial growth" through acquisitions which is also not sustainable (Collins & Kim, 2012).

significantly higher (*Chi-square* < 0.01) than 0.396 for physical firms. We find similar results for classification based on lifecycle but not based on industry, for which, the difference in coefficient is not significant.

Table 8 presents the results of equation (4), based on disaggregated accrual components. For the base case of year-matched classification, all individual accrual components present the same pattern, that is, they have higher factor loadings for knowledge firms, except *CondConserv*. Furthermore, at least for working capital accruals, factor loadings for knowledge firms are higher based on all three classifications. Overall, the results show that accrual and its components are significantly more persistent for knowledge firms than for physical firms.

6.4 Prediction of future cash flows

Barth et al. (2001) show that each accrual component is differently informative of future cash flows and, therefore, disaggregating accruals into its components significantly enhances the predictability of future cash flows. To compare the usefulness of the components of accruals in the prediction of future cash flows, we follow Barth et al. (2001) and estimate the regression of the one-year-ahead cash flows on current cash flows and accrual components separately for the knowledge and physical firms.

$$CashFlow_{i,t+1} = \alpha + \beta_1 CashFlow_{i,t} + \beta_2 WorkCap_{i,t} + \beta_3 LongTerm_{i,t} + \beta_4 CondConserv_{i,t} + \beta_5 NonArticulating_{i,t} + \beta_6 Finacial_{i,t} + \varepsilon_{i,t}. \quad (5)$$

A higher coefficient on an independent variable implies better predictability of the future cash flows (dependent variable). Table 9 presents the results of the regressions presented in equation 5. The results show that knowledge firms have a higher adjusted-R^2 as compared to physical firms, based on all matching methods. Results demonstrate that accruals are better predictors of cash flows for knowledge than physical firms. The coefficients on *LongTerm*,

NonArticulating, and *Financial* are significantly higher for knowledge firms than physical firms (*Chi-square* < 0.01). Nevertheless, the coefficient on *CondConserv* is insignificant in the case of knowledge firms and is also significantly lower than for physical firms. Furthermore, working capital accruals do not show higher coefficient for knowledge firms in any classifications.

7 Industry tests

We categorize all the firms in our sample by the Fama–French 48-industry classification (Fama and French 1997) and sort them by the highest to lowest values of knowledge intensity. Four industries representing the finance firms (Banking, Insurance, Real Estate, and Trading) are excluded as explained in section 4. Table 10 shows that the four industries with the highest knowledge intensity are Retail, Candy & Soda, Medical Equipment, and Computers. Retail, Candy & Soda likely represent large investments in marketing and brands. While Medical Equipment, and Computers likely represents investments in technology. Four industries with the lowest knowledge intensity are Mining, Precious Metals, Coal, and Utilities that typically operate with large physical assets and infrastructure. Table 10 also presents the average attributes of each industry based on its pooled firm-year observations. For expositional purposes, we highlight the four industries with the highest (lowest) values in each attribute by using bold (bold italic) letters.

The table shows that in general, the industries with the highest knowledge intensity have a lower magnitude of accruals and higher proxies of accrual quality. Their accruals also have a lower magnitude of negative coefficient with contemporaneous cash flows and are less persistent as compared to physical firms. Table 11 presents the Pearson and Spearman's rank correlations among knowledge intensity and average attributes of the industries. The knowledge intensity (*SGA_Intensity*) is negatively correlated with the magnitude of accruals (−0.17) and positively correlated with accrual quality (−0.46), association with contemporaneous cash flows (−0.37),

persistence (0.32), and predictability of future cash flows (0.17). These industry-based correlations are consistent with the results from pooled tests.

8 Conclusions

This paper systematically examines the differences between the magnitudes, composition, and attributes of accruals of knowledge and physical firms. We find that the accruals of knowledge firms are smaller in magnitude, show a significantly more negative association with contemporaneous cash flows, have better quality, are more persistent, and more useful in predicting future cash flows than for physical firms. These findings are important because they broaden our understanding of how intangible intensity is associated with the role of accruals as a measure of firm performance as compared to cash flows. Our paper contributes to the ongoing debate about the changes in the properties of earnings and the usefulness of accrual accounting, as the composition of listed firms shifts towards knowledge-intensive firms. Such a discussion is incomplete without the understanding of the magnitude, composition, and properties of accruals. Future research can explore how these differences in the properties of accruals impact the decisions by the management such as their propensity for accrual manipulation. Moreover, how these properties interact with the actions of market participants and the users of financial statements such as auditors, financial analysts, and credit providers can be an interesting venue for research.

REFERENCES

Allee, K. D., & Yohn, T. L. (2009). The demand for financial statements in an unregulated environment: An examination of the production and use of financial statements by privately held small businesses. *The Accounting Review*, 84(1), 1–25.

Allen, E. J., Larson, C. R., & Sloan, R. G. (2013). Accrual reversals, earnings and stock returns. *Journal of Accounting and Economics*, 56(1), 113–129.

Apte U. M., Karmarkar U. S., Nath H. K. (2008) Information services in the U.S. economy: Value, jobs, and management implications. *California Management Review*. 50(3):12–30.

Ball, R. (2001). Infrastructure requirements for an economically efficient system of public financial reporting and disclosure, Brookings-Wharton Papers on Financial Services, R. Litan and R. Herring (eds), Washington: Brookings Institution Press: 127-169.

Ball, R., & Shivakumar, L. (2006). The role of accruals in asymmetrically timely gain and loss recognition. *Journal of Accounting Research*, 44(2), 207–242.

Banker, R.D., R. Huang, and R. Natarajan. (2011). Equity incentives and long-term value created by SG&A expenditure. *Contemporary Accounting* Research 28: 794–830.

Barth, M. E., Cram, D. P., & Nelson, K. K. (2001). Accruals and the prediction of future cash flows. *The Accounting Review*, 76(1), 27–58.

Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings. *Journal of Accounting and Economics*, 24(1), 3–37.

Bushman, R. M., Lerman, A., & Zhang, X. F. (2016). The Changing Landscape of Accrual Accounting. *Journal of Accounting Research*, 54(1), 41–78.

Christensen, T. E., D'Adduzio, J., & Nelson, K. K. (2019). Is the sky falling? New evidence on accruals quality over time and around the world. *SSRN Electronic Journal*.

Collins, D. W., & Kim, J. (2012). Illusion of Growth: Merger-Related Transitory Growth and Its Implications for Growth and Accrual Mispricing. *SSRN Electronic Journal*.

Collins, D. W., Maydew, E. L., & Weiss, I. S. (1997). Changes in the value-relevance of earnings and book values over the past forty years. *Journal of Accounting and Economics*, 24(1), 39–67.

Corrado, C. A., & Hulten, C. R. (2010). How do you measure a "technological revolution"? *American Economic Review*, 100(2), 99–104.

Dai, R., Patatoukas, P. N., School, B. H., Thomas, J. K., Zhang, F., & Haas, B. (2020). Has accounting gone bad? https://www8.gsb.columbia.edu/ceasa/sites/ceasa/files/Dai%20Patatoukas%20Thomas%20

Zhang%202020.10.pdf

Dechow, M. (1994). Accounting & Economics The role of accounting accruals. *Journal of Accounting and Economics*, 18, 3–42.

Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting and Economics*, 50(2–3), 344–401.

Dechow, P. M., & Dichev, I. D. (2002). The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review*, 77(SUPPL.), 35–59.

Dechow, P. M., & Ge, W. (2006). The persistence of earnings and cash flows and the role of special items: Implications for the accrual anomaly. *Review of Accounting Studies*, 11(2–3), 253–296.

Dechow, P. M., Kothari, S. P., & Watts, R. L. (1998). The relation between earnings and cash flows. *Journal of Accounting and Economics*, 25, 133–168.

Denis, D. J., & McKeon, S. B. (2016). Persistent operating losses and corporate financial policies. *SSRN Electronic Journal.*

Dichev, I. D., & Tang, V. W. (2008). Matching and the Changing Properties of Accounting Earnings over the Last 40 Years. Source: *The Accounting Review*, 83(6), 1425–1460.

Dickinson, V. (2011). Cash flow patterns as a proxy for firm life cycle. *The Accounting Review*, 86(6), 1969–1994.

Eisfeldt, A. L. and D. Papanikolaou. (2013). Organization capital and the cross-section of expected returns. *The Journal of Finance* 68: 1365–1406.

Enache, L., & Srivastava, A. (2018). Should intangible investments be reported separately or commingled with operating expenses? New evidence. *Management Science*, 64(7), 3446–3468.

Fairfield, P. M., Whisenant, J. S., & Yohn, T. L. (2003). Accrued earnings and growth: Implications for future profitability and market mispricing. *The Accounting Review*, 78(1), 353–371.

Fama E.F., French K.R. (1997) Industry costs of equity. *J. Financial Econom*. 43(2):153–193.

Francis, J., & Smith, M. (2005). A reexamination of the persistence of accruals and cash flows. *Journal of Accounting Research*, 43(3), 413–451.

Gong, G., Li, L. Y., & Xie, H. (2009). The association between management earnings forecast errors and accruals. *The Accounting Review*, 84(2), 497–530.

Guay, W., Kothari, S., & Watts, R. (1996). A Market-Based Evaluation of Discretionary Accrual Models. Journal of Accounting Research, 34, 83-105.

Guay, W. R., & Sidhu, B. K. (2001). The Usefulness of Long-Term Accruals. *ABACUS*, 37(1).

Hao, Q. (2009). Accruals' persistence, accruals mispricing and operating cycle: Evidence from the

US. *International Journal of Accounting & Information Management*, 17(2), 198–207.

Hribar, P., & Collins, D. W. (2002). Errors in estimating accruals: Implications for empirical research. *Journal of Accounting Research* (Vol. 40, Issue 1, pp. 105–134).

In, A., Hewitt, M., Plumlee, M., & Yohn, T. L. (2014). Disaggregating operating and financial activities: Implications for forecasts of profitability. *Review of Accounting Studies*, 19(1), 328–362.

Jones, J. J. (1991). Earnings Management During Import Relief Investigations. *Journal of Accounting Research*, 29(2), 193.

Koh, P. S., & Reeb, D. M. (2015). Missing R and D. *Journal of Accounting and Economics*, 60(1),73–94.

Larson, C. R., Sloan, R., & Zha Giedt, J. (2018). Defining, measuring, and modeling accruals: a guide for researchers. *Review of Accounting Studies*, 23(3), 827–871.

Lev, B., & Zarowin, P. (1999). The Boundaries of Financial Reporting and How to Extend Them. *Journal of Accounting Research*, 37(2), 353.

Liu, J., Nissim, D., & Thomas, J. (2002). Equity Valuation Using Multiples. *Journal of Accounting Research*, 40(1), 135–172.

Nallareddy, S., Sethuraman, M., & Venkatachalam, M. (2020). Changes in accrual properties and operating environment: Implications for cash flow predictability. *Journal of Accounting and Economics*, 69(2-3), 101313.

Ohlson, J. A. (2014). Accruals: An overview. *China Journal of Accounting Research*, 7(2), 65–80.

Richardson, S. A., Sloan, R. G., Soliman, M. T., & Tuna, I. (2005). Accrual reliability, earnings persistence and stock prices. *Journal of Accounting and Economics*, 39(3), 437–485.

Richardson, S. A., Sloan, R. G., Soliman, M. T., & Tuna, I. (2006). The implications of accounting distortions and growth for accruals and profitability. *The Accounting Review*, 81(3), 713–743.

Rogers, J. L., & Stocken, P. C. (2005). Credibility of management forecasts. *The Accounting Review*. Vol. 80, Issue 4, pp. 1233–1260.

Sloan, R. G. (1996). Information in Accruals and Cash. The Accounting Review, 71(3), 289–315.

Srivastava, A. (2014). Why have measures of earnings quality changed over time? *Journal of Accounting and Economics*. Volume 57, Issues 2–3.

Watts, R. L. (1977). Corporate Financial Statements, A Product of the Market and Political Processes. *Australian Journal of Management*, 2(1), 53–75.

Weaver, B., & Wuensch, K. L. (2013). SPSS and SAS programs for comparing Pearson correlations and OLS regression coefficients. *Behavior Research Methods*, 45(3), 880–895.

TABLES

TABLE 1 – SAMPLE SELECTION

This table describes the selection of sample observations.

	Number of observations	Number of unique firms
All COMPUSTAT firm-year observations between 1990-2018	295,943	28,466
Excluding the financial industry (SIC 6000-6999)	(38,720)	(1,949)
	257,223	26,517
Excluding observations with missing accrual components	(103,533)	(9,876)
	153,690	16,641
Excluding firms with missing SIC codes	(2,572)	(648)
	151,118	15,993
Excluding observations with missing lags	(15,993)	(1,334)
	135,125	14,659

TABLE 2 – UNIVARIATE STATISTICS OF ACCRUAL COMPONENTS

This table presents the univariate statistics of comprehensive accruals (*ComprehensiveAccruals*) and its five components: working capital accruals (*WorkCap*), long term accruals (*LongTerm*), conditionally conservative accruals (*CondConserv*), non-articulating accruals (*NonArticulating*), and financial accruals (*Financial*). The sample includes 135,125 firm-year observations from 1990 to 2018. The calculation of all variables is described in Appendix A.

Variable	Mean	Std.	Lower Quartile	Median	Upper Quartile	Min	Max
ComprehensiveAccruals	0.377	2.755	−0.276	0.116	0.992	−19.269	19.732
WorkCap	0.139	0.974	−0.141	0.031	0.369	−6.268	5.373
LongTerm	1.451	6.097	−0.319	0.138	1.765	−23.369	59.055
CondConserv	−0.405	1.125	−0.271	−0.037	0.000	−15.753	0.000
NonArticulating	−0.415	2.840	−0.797	−0.022	0.346	−25.071	13.749
Financial	−0.383	3.269	−0.463	0.000	0.281	−27.103	17.248

TABLE 3 – CORRELATION BETWEEN MEASURES OF KNOWLEDGE INTENSITY

This table presents the Pearson (Spearman) correlations above(below) diagonal between the five measures of knowledge intensity: *SGA_Intensity_E* (SG&A expenses/Total expenses), *SGA_Intensity_A* (SG&A expenses/Total assets), *RD_Intensity_E* (R&D expenses/Total expenses), *RD_Intensity_A* (R&D expenses/Total assets), and *Market/Book Ratio*. *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively, in two-tailed tests.

Variable	*SGA_Intensity_E*	*SGA_Intensity_A*	*RD_Intensity_E*	*RD_Intensity_A*	*Market/Book Ratio*
SGA_Intensity_E	–	0.59***	0.21***	0.26***	0.20***
SGA_Intensity_A	0.78***	–	0.04***	0.30***	0.46***
RD_Intensity_E	0.38***	0.20***	–	0.78***	0.17***
RD_Intensity_A	0.37***	0.25***	0.98***	–	0.34***
Market/Book Ratio	0.23***	0.22***	0.31***	0.32***	–

TABLE 4 – DIFFERENCES IN CHARACTERISTICS OF KNOWLEDGE AND PHYSICAL FIRMS

This table presents the differences in means of key variables between knowledge and physical firms, defined as those in top quartile by SG&A intensity (SG&A/Total Assets). *, **, *** represent the significance of differences at the 10 percent, 5 percent, and 1 percent levels, respectively, in two-tailed tests. The firms are classified into knowledge and physical firms matched by year, industry Fama and French (1997), and stage of the firm life cycle (Dickinson 2011). In addition, we do analysis after excluding loss firms from the sample matched by years. The calculation of all variables is described in Appendix A.

	Matched by Year			Matched by Industry			Matched by Stage of Life Cycle			Matched by Year, Excluding Loss Firm-years		
VARIABLES	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference
Sales	642.9	2989.5	−2,346.5***	650.9	3499.7	−2,848.8***	819.1	3181.8	−2,362.7***	1650.0	4367.7	-2717.8***
Assets	334.9	5068.0	−4,733.1***	622.7	4688.3	−4,065.6***	455.4	5347.1	−4,891.7***	993.7	7246.4	-6252.7***
MV	837.5	6555.6	−5,718.1***	1088.2	6688.2	−5,600.0***	1117.4	6990.2	−5,872.8***	2375.3	9594.4	-7219.1***
Net Income	14.6	163.6	−149.0***	25.3	180.2	−154.9***	27.3	177.4	−150.2***	85.8	344.7	-258.9***
MB	*4.0*	*2.3*	*1.7***	3.9	2.4	1.5***	3.8	2.3	1.5***	2.4	1.5	0.9***

TABLE 5 – MAGNITUDE OF ACCRUAL COMPONENTS

This table presents the differences between comprehensive accruals and its components of knowledge and physical firms with knowledge intensity defined as SG&A/Total Assets. *, **, *** represent the significance of differences at the 10 percent, 5 percent, and 1 percent levels, respectively, in two-tailed tests. The firms are classified into knowledge and physical firms matched by year, industry Fama and French (1997), and stage of the firm life cycle (Dickinson 2011). In addition, we do analysis after excluding loss firms from the sample matched by years. The calculation of all variables is described in Appendix A.

	Matched by Year			Matched by Industry			Matched by Stage of Life Cycle			Matched by Year, Excluding Loss Firm-years		
VARIABLES	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference
Comprehensive Accruals	0.126	0.531	−0.406***	0.138	0.429	−0.291***	0.204	0.512	−0.308***	0.614	1.296	-0.682***
WorkCap	0.059	0.122	−0.063***	0.062	0.164	−0.102***	0.027	0.15	−0.123***	0.235	0.223	0.012
LongTerm	0.341	2.49	−2.149***	0.458	1.937	−1.479***	0.504	2.377	−1.873***	1.215	4.049	-2.834***
Neg_CondConserv	0.212	0.576	−0.364***	0.234	0.522	−0.289***	0.227	0.586	−0.359***	0.167	0.369	-0.203***
Neg_NonArticulating	0.007	0.739	−0.732***	0.051	0.565	−0.515***	0.055	0.698	−0.643***	0.513	1.579	-1.066***
Neg_Financial	0.045	0.736	−0.691***	0.083	0.566	−0.483***	0.03	0.687	−0.658***	0.158	1.027	-0.870***

TABLE 6 – THE TIMING ROLE AND QUALITY OF ACCRUALS

This table shows the results of Dechow and Dichev (2002) accrual quality measure calculated separately for knowledge and physical firms with knowledge intensity defined as SG&A/Total Assets. *, **, *** represent the significance of differences in a *Chi-square* test at the 10 percent, 5 percent, and 1 percent levels. The firms are classified into knowledge and physical firms matched by year, industry Fama and French (1997), and stage of the firm life cycle (Dickinson 2011). In addition, we do analysis after excluding loss firms from the sample matched by years. RMSE is Root Mean square Error. The calculation of all variables is described in Appendix A.

	Panel A			Panel B			Panel C			Panel D		
	Matched by Year			Matched by Industry			Matched by Stage of Life Cycle			Matched by Year, Excluding Loss Firm-years		
VARIABLES	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference
LagCashlow	0.100***	0.032***	0.068***	0.078***	0.046***	0.032***	0.116***	0.029***	0.087***	0.117***	0.040***	0.077***
	(28.09)	(12.19)	(41.07)	(22.08)	(17.08)	(8.48)	(31.66)	(11.24)	(66.84)	(23.25)	(10.89)	(32.90)
CashFlow	−0.107***	−0.052***	−0.055***	−0.085***	−0.065***	−0.020*	−0.110***	−0.054***	−0.056***	-0.112***	-0.058***	-0.054***
	(−29.57)	(−19.36)	(27.59)	(−23.81)	(−24.39)	(2.92)	(−30.07)	(−20.35)	(28.95)	(-22.39)	(-15.03)	(15.78)
LeadCashFlow	0.014***	0.016***	−0.002	0.017***	0.019***	−0.002	0.007**	0.016***	−0.009	0.001	0.017***	-0.016
	(3.84)	(6.02)	(0.07)	(4.99)	(7.02)	(0.03)	(2.03)	(6.04)	(0.97)	(0.18)	(4.77)	(2.17)
ΔPPE	−0.018	−0.161***	0.143**	−0.066	−0.175***	0.109*	−0.027	−0.158***	0.131***	0.124	-0.334***	0.458***
	(−0.33)	(−3.40)	(6.50)	(−1.45)	(−2.89)	(2.91)	(−0.42)	(−3.28)	(4.09)	(0.73)	(-4.00)	(7.42)
ΔSale	0.042***	0.084***	−0.042	0.046***	0.131***	−0.085***	0.042***	0.114***	−0.072***	0.144***	0.138***	0.006
	(5.92)	(4.28)	(2.34)	(6.16)	(8.12)	(11.43)	(5.27)	(5.95)	(6.88)	(6.54)	(4.35)	(0.01)
Constant	−0.004	−0.002		0.002	−0.012		−0.058***	0.013		-0.030***	0.010	
	(−0.66)	(−0.23)		(0.27)	(−1.47)		(−9.56)	(1.52)		(-2.61)	(0.75)	
Observations	28,137	30,096		27,449	31,110		28,772	29,961		16,089	17,350	
Adj. R-squared	0.05	0.02		0.03	0.03		0.05	0.02		0.05	0.02	
RMSE	0.95	1.38	−0.43	0.98	1.40	−0.42	1.02	1.40	−0.38	1.18	1.47	-0.29

TABLE 7 – PERSISTENCE OF ACCRUALS

Persistence is measured by regression of earnings on components of last year's earnings (cash flows and accruals). Regressions are estimated separately for knowledge and physical firms with knowledge intensity defined as SG&A/Total Assets. *, **, *** represent the significance of differences in a *Chi-square* test at the 10 percent, 5 percent, and 1 percent levels. The firms are classified into knowledge and physical firms matched by year, industry Fama and French (1997), and stage of the firm life cycle (Dickinson 2011). In addition, we do analysis after excluding loss firms from the sample matched by years. The calculation of all variables is described in Appendix A.

	Panel A Matched by Year			Panel B Matched by Industry			Panel C Matched by Stage of Life Cycle			Panel D Matched by Year, Excluding Loss Firm-years		
VARIABLES	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference
CashFlow	0.585*** (108.48)	0.471*** (80.40)	0.114*** (22.67)	0.520*** (96.72)	0.485*** (85.48)	0.035 (1.96)	0.580*** (106.84)	0.473*** (80.75)	0.107*** (17.6)	0.734*** (120.65)	0.508*** (77.91)	0.226*** (57.46)
Comprehensive Accruals	0.460*** (82.88)	0.396*** (75.08)	0.064*** (6.56)	0.413*** (77.08)	0.394*** (75.38)	0.019 (0.55)	0.457*** (83.90)	0.391*** (73.52)	0.066*** (6.52)	0.611*** (92.99)	0.453*** (71.24)	0.158*** (22.98)
Constant	0.099*** (12.97)	0.321*** (22.09)		0.126*** (15.01)	0.285*** (20.66)		0.190*** (23.76)	0.333*** (22.30)		0.455*** (41.05)	1.054*** (59.54)	
Observations	28,137	30,096		27,449	31,110		28,772	29,961		16,089	17,350	
Adj. R-squared	0.311	0.199	0.11	0.280	0.206	0.07	0.299	0.199	0.10	0.478	0.272	0.21

TABLE 8 – PERSISTENCE OF ACCRUALS COMPONENTS

Persistence is measured by regression of earnings on components of last year's earnings (cash flows and accruals). Regressions are estimated separately for knowledge and physical firms with knowledge intensity defined as SG&A/Total Assets. *, **, *** represent the significance of differences in a *Chi-square* test at the 10 percent, 5 percent, and 1 percent levels. The firms are classified into knowledge and physical firms matched by year, industry Fama and French (1997), and stage of the firm life cycle (Dickinson 2011). In addition, we do analysis after excluding loss firms from the sample matched by years. The calculation of all variables is described in Appendix A.

	Panel A			Panel B			Panel C			Panel D		
	Matched by Year			Matched by Industry			Matched by Stage of Life Cycle			Matched by Year, Excluding Loss Firm-years		
VARIABLES	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference
CashFlow	0.500***	0.343***	0.157***	0.456***	0.386***	0.070***	0.474***	0.352***	0.122***	0.516***	0.289***	0.227***
	(88.72)	(61.67)	(28.73)	(82.74)	(70.10)	(6.78)	(86.84)	(63.32)	(17.54)	(88.04)	(52.15)	(58.57)
WorkCap	0.435***	0.292***	0.143**	0.465***	0.304***	0.161***	0.454***	0.298***	0.156***	0.405***	0.191***	0.214
	(33.45)	(19.19)	(6.25)	(35.29)	(21.57)	(10.26)	(35.83)	(19.36)	(9.70)	(30.69)	(13.14)	(17.91)
LongTerm	0.234***	0.197***	0.037	0.239***	0.226***	0.013	0.265***	0.202***	0.063*	0.318***	0.179***	0.139
	(36.77)	(41.05)	(0.47)	(40.00)	(46.34)	(0.16)	(42.68)	(42.12)	(2.76)	(47.95)	(36.35)	(20.29)
CondConserv	−0.009	0.097***	−0.106*	−0.003	0.112***	−0.115**	0.062***	0.103***	−0.041	-0.305***	-0.292***	-0.013
	(−0.62)	(8.85)	(2.94)	(−0.24)	(10.12)	(4.42)	(4.62)	(9.25)	(0.50)	(-14.51)	(-16.86)	(0.02)
NonArticulating	0.208***	0.107***	0.101	0.249***	0.142***	0.107*	0.257***	0.125***	0.132**	0.307***	0.110***	0.197***
	(17.36)	(12.68)	(1.33)	(21.94)	(16.68)	(3.61)	(22.01)	(14.71)	(4.70)	(24.69)	(12.87)	(17.17)
Financial	0.300***	0.240***	0.060	0.288***	0.263***	0.025	0.271***	0.244***	0.027	0.269***	0.164***	0.105***
	(46.59)	(44.12)	(2.27)	(48.01)	(47.16)	(0.66)	(44.55)	(44.67)	(0.58)	(42.89)	(30.89)	(8.83)
Constant	0.063***	0.321***		0.079***	0.265***		0.184***	0.333***		0.609***	1.222***	
	(7.32)	(19.12)		(8.59)	(16.94)		(20.81)	(19.36)		(52.51)	(67.44)	
Observations	28,137	30,096		27,449	31,110		28,772	29,961		16,089	17,350	
Adj. R-squared	0.239	0.143	0.096	0.228	0.164	0.064	0.235	0.146	0.089	0.394	0.208	0.186

TABLE 9 – ACCRUALS' PREDICTION OF FUTURE CASH FLOWS

Accruals' ability to predict cash flows is measured by the coefficient on accruals and its components of accruals, in a regression of next year's cash flow on contemporaneous cash flow (*CashFlow*) and components of accruals. The regression is estimated separately for knowledge and physical firms with knowledge intensity defined as SG&A/Total Assets. The firms are classified into knowledge and physical firms matched by year, industry Fama and French (1997), and stage of the firm life cycle (Dickinson 2011). In addition, we do analysis after excluding loss firms from the sample matched by years. *, **, *** represent the significance of coefficients at the 10 percent, 5 percent, and 1 percent levels. In the difference column, *, **, *** represent the significance of the difference in the *Chi-square* test at the 10 percent, 5 percent, and 1 percent levels.

	Panel A			Panel B			Panel C			Panel D		
	Matched by Year			Matched by Industry			Matched by Stage of Life Cycle			Matched by Year, Excluding Loss Firm-years		
VARIABLES	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference	Knowledge Firms	Physical Firms	Difference
CashFlow	0.413***	0.227***	0.186***	0.363***	0.285***	0.078***	0.401***	0.238***	0.163***	0.474***	0.265***	0.209***
	(61.75)	(35.13)	(38.47)	(56.34)	(44.05)	(7.57)	(59.97)	(37.01)	(29.87)	(50.51)	(29.58)	(26.50)
WorkCap	0.332***	0.327***	0.005	0.320***	0.344***	−0.024	0.343***	0.323***	0.020	0.290***	0.287***	0.003
	(21.52)	(18.54)	(0.01)	(20.78)	(20.77)	(0.20)	(22.07)	(18.20)	(0.13)	(13.71)	(12.21)	(0.00)
LongTerm	0.182***	0.145***	0.037	0.149***	0.179***	−0.030	0.164***	0.151***	0.013	0.228***	0.145***	0.083**
	(24.06)	(26.10)	(0.91)	(21.24)	(31.27)	(0.82)	(21.54)	(27.24)	(0.13)	(21.48)	(18.23)	(4.54)
CondConserv	0.012	0.090***	−0.078	0.022	0.088***	−0.066	0.089***	0.101***	−0.012	-0.204***	-0.041	-0.163
	(0.73)	(7.06)	(1.63)	(1.45)	(6.80)	(1.32)	(5.47)	(7.85)	(0.04)	(-6.06)	(-1.46)	(1.52)
NonArticulating	0.225***	0.176***	0.049	0.189***	0.191***	−0.002	0.214***	0.178***	0.036	0.276***	0.201***	0.075
	(15.81)	(18.03)	(0.00)	(14.22)	(19.06)	(0.00)	(14.93)	(18.07)	(0.36)	(13.85)	(14.61)	(1.77)
Financial	0.231***	0.151***	0.080**	0.204***	0.184***	0.020	0.202***	0.152***	0.050	0.231***	0.152***	0.079*
	(30.16)	(23.97)	(4.55)	(29.06)	(28.09)	(0.34)	(27.17)	(24.08)	(1.84)	(23.02)	(17.77)	(2.86)
Constant	−0.066***	−0.037*		−0.053***	−0.023		0.005	−0.006		0.156***	0.263***	
	(−6.50)	(−1.92)		(−4.89)	(−1.26)		(0.50)	(−0.28)		(8.39)	(8.99)	
Observations	28,137	30,096		27,449	31,110		28,772	29,961		16,089	17,350	
Adj. R-squared	0.12	0.05	0.08	0.11	0.07	0.04	0.11	0.05	0.06	0.16	0.06	0.10

TABLE 10 – ACCRUAL PROPERTIES BY INDUSTRY

This table presents the accrual properties of each industry calculated by using its pooled observations from 1990 to 2018. All the firms are classified by the Fama French 48-industry method. The industries are sorted by their average quartile ranking of knowledge intensity, measured by SG&A/Total Assets (*SGA_Intensity*). Association with CF is the regression coefficient in the regression of cash flows on comprehensive accruals. Persistence is measured by regression of earnings on components of last year's earnings (cash flows and accruals). Accruals' ability to predict cash flows is measured by the coefficient on accruals, in a regression of next year's cash flow on contemporaneous cash flow (*CashFlow*) and accruals. Quality represents the root mean squared error from Dechow and Dichev (2002) accrual quality model. The top (bottom) four industries for each attribute are highlighted in bold (bold italic) letters. Calculation of all variables is described in Appendix A

			Accrual Characteristics			
Ind Code	Industry Name	*Knowledge Intensity*	Association with CF	Persistence	CF Prediction	Quality
42	Retail	**0.59**	-0.11	0.50	0.29	1.99
3	Candy & Soda	**0.58**	-0.08	0.28	0.18	1.95
12	Medical Equipment	**0.57**	-0.05	**0.59**	**0.41**	**1.18**
35	Computers	**0.53**	-0.08	0.32	0.28	1.60
34	Business Services	0.51	-0.07	0.44	0.28	1.47
10	Apparel	0.49	**-0.19**	0.51	0.25	1.73
9	Consumer Goods	0.48	-0.11	0.34	0.29	1.87
6	Recreation	0.47	**-0.20**	0.40	0.21	**1.38**
37	Measuring and Control Equipment	0.45	-0.09	**0.62**	0.25	**1.27**
33	Personal Services	0.43	-0.06	**0.60**	**0.38**	1.50
41	Wholesale	0.40	-0.17	0.45	0.25	2.00
22	Electrical Equipment	0.38	-0.10	0.49	0.30	1.63
36	Electronic Equipment	0.37	-0.08	0.41	0.24	1.50
8	Printing and Publishing	0.35	-0.01	***0.23***	0.17	2.78
2	Food Products	0.35	-0.06	0.33	0.22	2.07
21	Machinery	0.33	-0.09	0.47	0.23	1.95

13	Pharmaceutical Products	0.33	-0.04	0.58	**0.41**	1.48
11	Healthcare	0.30	-0.02	0.51	0.19	1.68
7	Entertainment	0.29	-0.04	0.29	0.09	2.06
48	Almost Nothing	0.28	***0.00***	***0.20***	0.11	1.45
15	Rubber and Plastic Products	0.28	-0.03	0.30	0.33	2.15
4	Beer & Liquor	0.26	-0.02	**0.60**	0.34	1.68
14	Chemicals	0.26	-0.10	0.40	0.30	2.49
23	Automobiles and Trucks	0.26	-0.08	0.30	0.17	***2.96***
17	Construction Materials	0.25	-0.10	0.37	***0.08***	2.11
38	Business Supplies	0.24	-0.02	***0.23***	0.31	2.45
16	Textiles	0.23	-0.18	0.24	***0.08***	2.33
18	Construction	0.23	**-0.23**	0.47	0.24	2.03
32	Communication	0.22	-0.02	0.34	0.28	2.50
43	Meals	0.21	-0.07	0.34	0.32	1.82
24	Aircraft	0.20	-0.06	0.38	0.26	2.74
20	Fabricated Products	0.20	-0.12	0.50	0.13	1.95
26	Defense	0.20	-0.12	0.24	0.27	***2.93***
5	Tobacco Products	0.19	**-0.21**	***0.04***	0.31	***4.38***
25	Shipbuilding	0.19	-0.14	0.44	**0.41**	2.60
1	Agriculture	0.16	***0.02***	0.24	0.30	1.40
39	Shipping Containers	0.14	-0.11	0.35	***0.04***	2.16
19	Steel Works Etc.	0.13	-0.06	0.37	0.17	2.70
30	Petroleum and Natural Gas	0.12	-0.05	0.40	0.24	2.78
40	Transportation	0.12	-0.04	0.37	0.17	2.85
28	Mining	***0.11***	***0.01***	0.24	0.34	2.80
27	Precious Metals	***0.09***	-0.05	0.30	***0.02***	**1.30**
29	Coal	***0.05***	***0.02***	0.37	0.22	***4.47***
31	Utilities	***0.00***	-0.02	0.44	0.35	1.67

TABLE 11 – CORRELATION BETWEEN KNOWLEDGE INTENSITY AND PROPERTIES OF ACCRUALS (INDUSTRY ANALYSIS)

This table presents the correlation between knowledge intensity and properties of accruals. The observations are based on the Fama French 48 industry classification. Association with CF is the regression coefficient in the regression of cash flows on comprehensive accruals. Persistence is measured by regression of earnings on components of last year's earnings (cash flows and accruals). Accruals' ability to predict cash flows is measured by the coefficient on accruals, in a regression of next year's cash flow on contemporaneous cash flow (*CashFlow*) and accruals. Quality represents the root mean squared error from Dechow and Dichev (2002) accrual quality model. *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively, in two-tailed tests. Calculation of all variables is described in Appendix A

		Accrual Characteristics			
	Knowledge_intensity	*Association with CF*	*Persistence*	*CF Prediction*	*Quality*
Knowledge_Intensity		−0.37**	0.32**	0.17	−0.46***
Association with CF	−0.35**		−0.05	0.09	−0.03
Persistence	0.33**	−0.20		0.33**	−0.51***
CF Prediction	0.11	0.11	0.27*		−0.05
Quality	−0.48***	−0.03	0.46***	−0.15	

APPENDIX A – DEFINITIONS AND MEASUREMENT OF VARIABLES AND ACCRUAL PROPERTIES

Regression variables as defined by Larson et al. (2018) are in italics. Compustat data items are listed in capital letters.

Variables		
ComprehensiveAccruals	=	ΔCEQ – ΔCHE Comprehensive accruals (*ComprehensiveAccruals*) is measured by the change in common stockholders' equity (ΔCEQ) less the change in cash and cash equivalents (ΔCHE).
Earnings	=	CITOTAL − DVP + STKCO Earnings (*Earnings*) is defined as comprehensive income (CITOTAL) less preferred dividends (DVP) plus stock-based compensation expense (STKCO).
CashFlow	=	*Earnings – ComprehensiveAccruals* Cash flows (*CashFlow)* is defined as the difference between earnings and accruals.
CondConserv	=	min ((−FOPO + TXBCO + STKCO),0) + MIN ((XIDO – XIDOC),0) Conditionally conservative accruals (*CondConserv*) is measured by adding back excess tax benefits from stock-based compensation (TXBCO) and stock-based compensation expense (STKCO) to (FOPO). Compustat does not separately measure other less common items, such as adjustments for minority interest in earnings. Therefore, the resulting amount is included in *CondConserv* if it is less than zero and thus consistent with an asset write-down. As some asset write-downs are included in (XIDO) on the income statement but excluded from (XIDOC) and (FOPO) on the statement of cash flows, the difference between (XIDO) and (XIDOC) is also added back whenever this difference is less than zero.
Opacc	=	(ΔAT−ΔCHE−ΔIVAEQ−ΔIVAO) − (ΔLT−ΔDLC−ΔDLTT) where ΔAT denotes the change in total assets, ΔCHE denotes the change in cash and short-term investments, ΔIVAEQ and ΔIVAO denote the changes in long-term investments and advances, ΔLT denotes the change in total liabilities, ΔDLC denotes the change in debt included in current liabilities and ΔDLTT denotes the change in debt included in long-term liabilities.
NonArticulating	=	*Opacc*−(NI−DVP+STKCO−OANCF−(IVNCF+IVCH−SIV−IVSTCH)) Non-articulating accruals (*NonArticulating*) is measured as the difference between operating accruals measured from the balance sheet (*Opacc*) and operating accruals measured from the statement of cash flows i.e. Earnings (NI − DVP + STKCO) minus cash from operating activities (OANCF) minus cash from investing activities that relate to the firm's operations (IVNCF + IVCH − SIV − IVSTCH) where IVNCF is the COMPUSTAT variable for cash from investing activities, while IVCH, SIV, and IVSTCH are components of IVNCF that primarily capture cash flows relating to financial assets, rather than operating assets.

Financial	=	*ComprehensiveAccruals – Opacc* Financial accruals (*Financial*) is measured as comprehensive accruals (*ComprehensiveAccruals*) minus operating accruals (*Opacc*) and represents changes in all investment accounts, all debt accounts, and all equity accounts other than common equity. Note that changes in accounts that COMPUSTAT classifies as part of shareholders equity but not part of common shareholders equity are included in *Financial*. For example, from the perspective of common equity holders, the issuance of preferred equity would result in a negative financial accrual.
WorkCap	=	−RECCH – INVCH – APALCH – TXACH − AOLOCH where (RECCH) is the decrease in accounts receivable, (INVCH) is the decrease in inventories, (APALCH) is the increase in accounts payable and accrued liabilities, (TXACH) denotes the increase in accrued taxes, and (AOLOCH) denotes the net decrease in other assets and liabilities.
LongTerm	=	*Opacc – WorkCap* Long term accruals (*LongTerm*) is simply defined as operational accruals (*Opacc*) minus working capital accruals (*WorkCap*).

Properties

Magnitude	We measure the magnitude of accruals and its components by their arithmetic mean. We use the median as an alternative measure.
Quality	We use the Dechow and Dichev (2002) model, as modified by Francis et al. (2005), to measure accruals quality: $\Delta WorkCap_{i,t} = \alpha + \beta_1 CashFlow_{i,t-1} + \beta_2 CashFlow_{i,t} + \beta_3 CashFlow_{i,t+1} + \beta_4 \Delta PPE_{i,t} + \beta_5 \Delta SALE_{i,t} + \varepsilon_{i,t}.$ We measure the quality of accruals by (a) the strength of negative association between contemporaneous cash flows and working capital accruals, β_2, and (b) the standard deviation of the residuals (RMSE) of this model where RMSE is an inverse measure of accrual quality.
Persistence	We measure the persistence of accruals by regressing one-year ahead income on current year cash flows and accruals: $Earnings_{i,t+1} = \alpha + \beta_1 CashFlow_{i,t} + \beta_2 ComprehensiveAccruals_{i,t} + \varepsilon_{i,t}.$ A higher β_2 implies higher persistence of accruals in this equation. We also estimate the same model by using accrual components instead of *ComprehensiveAccruals*. $Earnings_{i,t+1} = \alpha + \beta_1 CashFlow_{i,t} + \beta_2 WorkCap_{i,t} + \beta_3 LongTerm_{i,t} + \beta_4 CondConserv_{i,t} + \beta_5 NonArticulating_{i,t} + \beta_6 Financial_{i,t} + \varepsilon_{i,t}.$

Prediction of future cash flows	We measure the ability of accrual components to predict future cash flows by estimating the regression of the one-year-ahead cash flows on current cash flows and accrual components: $CashFlow_{i,t+1} = \alpha + \beta_1 CashFlow_{i,t} + \beta_2 WorkCap_{i,t} + \beta_3 LongTerm_{i,t} + \beta_4 CondConserv_{i,t} + \beta_5 NonArticulating_{i,t} + \beta_6 Finacial_{i,t} + \varepsilon_{i,t}$. A higher coefficient on an independent variable implies better predictability of the future cash flows (dependent variable).

All continuous variables are winsorized at the first and 99th percentiles.