Do firm-to-segment reconcilable earnings differences affect stock prices?

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March 24, 2011

We thank Thomas Hemmer, Lynn Rees, Robin Tarpley, Wayne Thomas, and workshop participants at Louisiana State University, Pennsylvania State University, University of Colorado at Boulder, University of Houston, University of Oregon, University of Utah, 2008 Midwest AAA region meeting, 2008 Mid-Atlantic AAA region meeting, and the 2010 21st Annual Conference on Financial Economics and Accounting and our discussant Bill Mayhew.

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Abstract: While SFAS No. 131 is intended to increase the transparency of financial reporting using a "management approach", it may reduce shareholders' ability to interpret segment disclosures relative to the 'industry approach' employed under SFAS No.14. This study investigates whether firm-segment reconcilable differences (FSD) affect stock prices and whether abnormal returns can be earned using information about two components of earnings: aggregated segment earnings and FSDs. We compute FSDs as the difference between firm-level consolidated earnings and aggregated segment-level earnings. Firms that report negative FSDs have greater sales and profitability, greater return on equity, as well as more operating cash flows and firm growth. This suggests firms that report aggregated segment earnings greater than firm-level consolidated earnings may better off financially as a firm. Our findings show that mispricing does occur, when firms report positive FSDs, by the market underestimating FSD persistence. Investors can also earn positive abnormal returns when investors take a long (short) position with the portfolio with the highest (lowest) absolute FSDs. On the contrary, we find investors earn negative abnormal returns when firms report negative FSDs. Collectively, this study provides evidence that mispricing occurs and that investors over/under estimate the importance and/or persistence of FSDs.

JEL classification: M41
Keywords: SFAS No. 131, Firm Segment Differences, Segment Reporting, Market Efficiency

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1 Introduction

This study investigates whether the market accurately incorporates the pricing effects of the persistence of segment-related components of earnings: aggregated segment earnings and firm-segment reconcilable differences (FSD). This study adds to the extant literature on the pricing of different components of earnings and the quality of financial reporting under the SFAS No. 131 segment reporting regime. The results indicate that mispricing does occur, when firms report positive FSDs, by the market underestimating FSD persistence. For these same firms, investors can also earn positive abnormal returns. On the contrary, we find investors earn negative abnormal returns when firms report negative FSDs. Collectively, this study provides evidence that mispricing occurs and that investors over/under estimate the importance of FSDs..

In 1997, Financial Accounting Standards Board (FASB) introduced SFAS No. 131, *Disclosures about Segments on Enterprise and Related Information* (hereafter referred to as SFAS No. 131). This standard was developed primarily to enable external users to view companies "through the eyes of management" by requiring firms to report segment financial information consistent with how the business is managed internally (a.k.a. the management approach). Therefore, the management approach may lead to reported segment-level earnings measures that differ from GAAP earnings measures. As a result, segment-level data in financial reports may not necessarily reconcile or exactly equate to the consolidated financial information provided at the firm level. In other words, the whole (firm-level) may not equal the sum of its parts (segment-level). We refer to the "sum of its parts" as the total aggregated segment-level earnings. Accordingly, we compute firm-segment differences as the difference between firm-level consolidated earnings and aggregated segment-level earnings from all identifiable

segments. As a result, we decompose earnings into the following two components: aggregated segment earnings and firm-segment reconcilable differences. Under the management approach, these FSDs may arise from (1) differences in measuring performance – management discretion at the segment-level versus the "traditional" GAAP operating earnings at the firm-level, (2) unreportable segments, (3) unallocated costs and (4) unallocated revenue or gains. An illustration of the derivation of FSDs is provided as Figure 1. In fact, Berger and Hann (2007) use FSD to adjust individual segment performance, which suggests that FSDs represent the aggregated segment profitability, which is not included in segment reporting under SFAS No. 131.

The standard setters' objectives were to increase comparability and transparency of the financial statements among firms. Many proponents of the standard, particularly analysts, anticipated that the management approach would increase transparency between internal and external observers, by better aligning internal and external financial reporting. This argument is consistent with agency cost theory, which posits that disclosures may be deficient in consequence to conflicts of interests between managers and shareholders (Jensen and Meckling 1976; Berger and Hann 2007). The requirement of SFAS No. 131 mandates managers to disclose information that would probably otherwise not be disclosed due to agency problems.

While the 'management approach' is intended to increase transparency, it potentially reduces the ability of shareholders and other users to interpret the disclosures. Opponents of the standard, primarily managers of the firms, have argued that the management approach is an "unstandard standard" because of the potential lack of consistency, comparability, and reliability of segment-level information within firms and across firms (Reason, 2001). This argument is consistent with the proprietary cost hypothesis, in which, disclosures make public proprietary information and proprietary costs hinder disclosure (Verrecchia 1983; Hayes and Lundholm

1996). Prior research has shown that SFAS No. 131 imposes proprietary costs by requiring firms to disclose proprietary information (e.g., Botosan and Stanford, 2005). To mitigate increased proprietary costs, managers may utilize the 'unstandard standard' to protect the firm from this competitive disadvantage.

James J. Leisenring, a former member of the FASB dissented from SFAS No. 131 as it relates to the measurement of reported segment performance. Although Leisenring supported the management approach for identifying reportable operating segments, he claimed that the ambiguity in outlining the proper measurement of segment earnings might lead to decreased comparability across firms. Several critics share this opinion. In fact, some refer to the ambiguity inherent in the standard, with respect to the identification of reportable segments and the appropriate measures of profitability to be presented, has led others to question whether the objectives of the standard could be reached (Reason, 2001).

Consequently, the Securities & Exchange Commission (SEC) continues to raise concerns about the implementation of the management approach as it continues to encounter cases of inappropriate applications of the standard (e.g.: SEC v. Richard Causey, 2004; Bayless, 2001; Turner, 1999). The SEC has expressed its intent to make segment disclosure requirements a central focus of SEC staff reviews. The SEC's concerns regarding the current segment reporting practices suggest that the standard may not be as effective in reaching its proposed objectives as initially anticipated.

This study intends to shed additional light on this issue by examining segment-to-firm level earnings reconciliations, since these reconciliations represent the aggregated segment performance, as indicated by Berger and Hann (2007).[1] As presented in Appendix A, Caterpillar,

[1] While segment reporting using the management approach is in accordance with GAAP, how a company chooses to report revenue, earnings, expenses, and other financial data at the segment level may differ from the derivation of

Inc. explicitly states, in its 1998 10-K, that its segment reporting under the management approach has limited usefulness to external readers of its financial statements. It discloses traditional GAAP-based financial results for all business lines in their MD&A. It does not provide details of the reconciliation between its firm-level and segment level measurements required under SFAS No. 131. Another example, Briggs & Stratton uses Economic Value Added (EVA) to evaluate divisional performance and to assist in internal decision making (i.e., management approach). However, the firm reports its segment information using GAAP-based measurements rather than its EVA measurements of performance. There are many examples of these inconsistencies and variations in firms' segment reporting under the SFAS No. 131 segment reporting regime. In contrast, Cooper Rubber & Tire Co. reports segment financial information that is consistent with both GAAP and how they manage the business internally. We primarily focus on examining FSDs and mispricing under the current SFAS 131 segment reporting regime since this is the regime that firms, investors, analysts, and regulators are operating under at this time. However, we do provide a brief discussion, in the additional analysis section, on the pre- and post-SFAS No. 131 segment reporting regimes.

This study adds to the extant literature by determining whether the market correctly incorporates the pricing effects of the persistence of aggregated segment earnings and FSDs under SFAS No. 131. If the market fails to understand the time-series properties of aggregated segment earnings or FSDs, then stock prices will systematically understate/overstate the value of the firm in a predictable manner. That is, if the market perceives correctly the persistence of FSDs, then stock prices will move in a predictable manner in the subsequent year. Therefore, a trading strategy based on FSD component of earnings would prove beneficial.

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such components under GAAP. For example a firm may choose to recognize sales at the time a sales agreement is made for segment reporting while GAAP, at the consolidated reporting level, does not allow this. This study's reference to GAAP or non-GAAP is solely based on the derivation of earnings at the segment level.

If FSD represent the aggregated segment performance, it is only natural to investigate negative and positive performance separately. Therefore, we investigate positive and negative FSDs in detail. Our findings indicate that the market understates the FSD component of earnings for firms that report positive FSDs, giving rise to a positive relation between positive FSDs and abnormal stock returns. The results suggest that stock prices do not reflect accurately the time-series properties of positive FSDs. It indicates that it is possible to make positive abnormal profits by following a trading strategy focused on positive FSDs. In contrast, we find that the market incorporates aggregated segment earnings and FSD components of earnings into stock prices appropriately when the firm reports negative FSDs. In contrast, the same trading strategy results in negative abnormal returns for firms that report negative FSDs. Overall, our results suggest that market participants cannot adequately interpret the firm-to-segment reconciliations resulting from 'management approach' accounting information, thereby causing them to underestimate the significance of these reconciliations when firms report positive FSDs. If financial reporting, via segment disclosure, becomes more transparent as predicted by the agency cost hypothesis, it is less likely that market mispricing would occur. However, if financial reporting becomes less transparent as predicted by the proprietary hypothesis, it is more likely that market mispricing would occur. Our empirical findings support the proprietary cost hypothesis.

As with any study in this area, conclusions cannot be made without investigating whether apparent abnormal returns are the result of the incorrect measurement or the control for underlying risk factors. We follow the tests in Thomas (2000) to help disentangle these two competing hypotheses. We estimate the relation between long-term stock returns and FSDs. If FSDs are a proxy for risk, then abnormal returns would persist beyond the subsequent year. A

permanent shift in risk will be associated with higher returns in subsequent years. If the market does not fully understand the persistence of FSDs, then abnormal returns should exist only in the immediate subsequent year, and should not continue. It is less likely that mispricing could occur for several subsequent years, because the market will correct for its (incorrect) prior belief when earnings are realized above or below expectations in the subsequent year (Thomas, 2000). The results in this study show no relation between long-term stock returns and current FSDs. Thus, the market appears to correct fully for its mispricing in the subsequent year so that abnormal returns do not persist for more than one year.

Additional analysis shows that mispricing does not occur and investors do not earn abnormal returns under the SFAS No. 14 segment reporting regime before SFAS No. 131 became effective. The remainder of this paper is organized as follows: section 2 describes the related literature and research design; section 3 presents the sample selection criteria and descriptive statistics; section 4 discusses our empirical findings and section 5 summarizes and concludes the paper.

2 Related Literature and Research Design

2.1 Related Literature

In the case of mandated segment disclosure requirements, the leeway in segment reporting standards provides managers with a means to strategically disclose segment information (Nagarajan and Sridhar, 1996; Botosan and Harris, 2000). Nagarajan and Sridhar (1996) generated an analytical model indicating that similar mandates may induce firms to (1) reduce the value relevance of their disclosures and (2) fail to disclose some value-relevant information. Therefore, mandating segment disclosures could reduce the relevance of segment

information, which could lessen a firm's transparency and actually impede the proposed benefits of SFAS No. 131.

The argument regarding the costs and benefits of SFAS No. 131 is still an ongoing issue in the academic literature. For example, prior research shows an increase in the number of reported segments post-SFAS No. 131 (e.g., Herrmann and Thomas, 2000; Street, et al., 2000; Ettredge, et al., 2000), and mixed evidence on the incremental information provided with segment disclosure under the SFAS No. 131 segment reporting regime (e.g., Venkataraman, 2001; Berger and Hann, 2003; Botosan and Harris, 2005). While prior research on the effects of SFAS No.14 has generally found that segment reporting provides an incremental benefit over firm-level earnings for the prediction of future earnings (e.g., Kinney, 1971; Collins, 1976; Chen and Zhang, 2003), little evidence exists on how segment disclosure, beyond firm-level data, affects market efficiency.

For example, Ettredge et al. (2006) assesses whether SFAS No. 131 improved disclosure about the diversity of multiple segment firms' operations. They employ a different metric to assess the effect of SFAS No. 131 on disclosures of information, about the diversity of operating income across segments, by continuous multiple-segment reporters. Their scenario assumes managers did not use the flexibility inherent in the SFAS No. 131 management approach to transfer revenues and costs among segments, so as to conceal differences in segment profitability. They find a post-SFAS No. 131 increase in cross-segment variability of segment profits, an increase in the association between reported and inherent cross-segment variability, and an increase in association between reported variability and capital market incentives to disclose. They interpret their findings as evidence that SFAS No. 131 increased the transparency of segment profitability disclosures, and as indicating SFAS No. 131 allowed firms depending more

on external financing to disclose more about differences in segment profitability. Our study differs from theirs in that we examine the extent to which the variability in segment earnings (i.e., profit) measurement differs between segment reporting regimes, as well as whether investors can adequately interpret the information in these segment earnings and their corresponding reconciliations.

If there is more flexibility inherent in SFAS No. 131 which allows the reporting of segment earnings measurements to be inconsistent with GAAP earnings measurements, we would expect FSDs to be more significant in post-SFAS No. 131 period. However, we do acknowledge that larger FSDs do not necessarily equate to a change in a firm's overall transparency to investors. That said, a decrease in the absolute value of the FSDs would indicate that aggregated segment earnings are more closely aligned with reported firm earnings post-SFAS No. 131.

Thomas (1999) and Hope et al. (2008) invesigate the effects of SFAS 131 on the market's valuation of foreign earnings. Thomas (1999) finds that the market understates foreign earnings' persistence which is consistent with market mispricing. Hope et al. (2008) find that investors' mispricing of foreign earnings lessens (and in fact disappears) subsequent to the adoption of SFAS No. 131. Our study differs, from Thomas (1999) and Hope et al. (2008), in that they focus on foreign earnings, whereas we investigate the effects of SFAS No. 131 on the market's valuation of total aggregated segment earnings (which is incrementally important to firm valuation – Chen and Zhang, 2003) and the corresponding reconciliation of aggregated segment-to-firm level earnings (i.e., FSDs). Since the earnings measurements used for segment reporting may differ from earnings measurement at the firm-level, focusing on the reconciliation from segment to firm-level earnings is essential to determine whether these reconciliations are

important to firm valuation.Ultimately, it is still unclear ex ante whether SFAS No. 131 should improve earnings predictability, earnings quality or mitigate any segment-related mispricing. A number of studies have concluded that giving management discretion under GAAP deteriorates earnings quality and predictability (see literature review by Dechow and Skinner, 2000). In contrast, other studies have concluded that giving management discretion under GAAP improves earnings quality and predictability (e.g., Ewert and Wagenhofer, 2005; Dechow and Skinner, 2000).

2.2 Firm-Segment Reconcilable Difference

Firm-to-segment reconciliations (i.e., FSDs) provide a reconciliation of the reported segment financial information disclosed applying the management approach prescribed under the SFAS No. 131 reporting regime to the consolidated financial information reported by the firm. This reconciliation may include differences in earnings measurement– management approach earnings measurement at the segment-level versus "traditional" GAAP earnings at the firm-level, segments that do not meet the reporting requirement threshold, unallocated costs or expenses and/or unallocated revenue or gains. Firms provide information about the earnings (both sales and expenses) measurement differences that exist between their aggregated segment earnings and consolidated earnings. These firms vary widely in the level of detail they provide for their segment disclosure in their annual report. Refer to Appendix A for an example of segment earnings disclosure and its corresponding reconciliation to consolidated firm earnings.

Two concurrent studies, Ettredge and Wang (2010) and Alfonso, et. al (2010) examine the determinants of FSDs. Ettredge and Wang (2010) examine the determinants of FSDs (they refer to them as GAPs in their study) as well and investigate whether aggregated segment

earnings are more persistent and informative than corporate (i.e., firm-level) earnings when FSDs exist. Their results suggest that when FSDs exist, the aggregated segment earnings is modestly more persistent than are corporate earnings. This difference appears to be attributable to negative FSDs. When negative FSDs exist, the aggregated segment earnings are more informative (in terms of its association with concurrent stock returns) than are corporate earnings. When positive FSDs exist, summed segment income has a weaker association with concurrent stock returns than corporate earnings. Our differs from Ettredge and Wang (2010) since we focus on the persistence and mispricing of FSDs.

Alfonso, et al. (2010) provides evidence that FSDs are value relevant and firm-segment reconcilable differences do matter to the capital markets, In addition, using a determinants model, Alfonso, et al. (2010) focuses on managers' decisions to report FSDs. They find that the reporting of FSDs can be significantly influenced by agency costs. This study finds that larger firms, firms with higher leverage, and higher ROA are more likely to report aggregated segment-level earnings less than firm-level earnings (FSD>0). Furthermore, this study finds that firms with a greater number of segments, greater accruals, a loss, greater aggregated segment profits, and a Big N auditor are less likely to report FSD>0. Firms in which the agency cost motive dominates are approximately 2.042 times as likely to report FSD>0 as are firms in which the agency cost motive does not dominate, which suggests manager's segment reporting choice is partly driven by agency costs. Our study contributes to prior research by being one of the first studies to examine FSDs, and contributes to the understanding of segment disclosure practices by examining a unique setting in which management has discretion, based on how the firm is managed internally, to report segment information in a manner that may not be consistent with

firm-level GAAP reported earnings measurements. It further contributes to our understanding of market pricing as it relates to earnings components (i.e., FSD and AGSEG components).

Berger and Hann (2007) use the 'adjusted' return on sales (ADJROS) as a measure of the profitability at the segment level, which is defined as the following:

where *E* represents the earnings, *S* represents the sales, *i* represents one of the reported segment in the firm, *n* represents the number of segment. That is, ROS at the segment level is adjusted by a portion of the deviation between the sum of segment profits and firm-level earnings, where the portion is equal to the ratio of the segment's sales to the sum of segment sales, where an industry is defined at the segment level. Therefore, there are $ADJROS_1$ and $ADJROS_2$ in a firm with two reported segments. If the aggregated segment earning is greater than the firm level earnings, ROS is adjusted upward proportionally. If the aggregated segment earning is less than the firm level earnings, ROS is adjusted downward proportionally.

The sum of ROS_1 and ROS_2 represents the aggregated profitability of segments, as shown below:

where $[(E_1+E_2)-E_f]$ is equivalent to FSD. Note FSD is defined as $[E_f - (E_1+E_2)]$. Therefore, the aggregated profitability of segments is:

As shown in the above equation, the FSD represents the aggregated segment profitability, which is not included in the segment reporting under SFAS No. 131. Under the agency cost hypothesis, such information may not be reported in consequence to conflicts of interests between managers and shareholders. SFAS No. 131 requires management to disclose information which otherwise might not be disclosed due to agency problems. In this situation, the financial reporting is more likely to become more transparent, and market mispricing would be less likely to occur.

On the contrary with the proprietary cost hypothesis, reporting FSDs different from zero may increase firms' proprietary costs in competitive markets. SFAS No. 131 imposes proprietary costs by requiring firms to disclose such information (e.g., Botosan and Stanford, 2005). In this case, the financial reporting is less likely to become more transparent, and market mispricing should occur.

2.3 Research Design

The primary focus of this paper is to test whether the market correctly prices firms' securities relative to the persistence of the aggregated segment and FSD components of earnings. In order to evaluate whether mispricing occurs for the aggregated segment and FSD components of earnings, we first examine the persistence of segment-based earnings by decomposing consolidated firm-level earnings into an aggregated segment earnings and an FSD component of earnings. As with earnings, both components are subject to different levels of measurement errors and non-recurring problems and therefore should persist differentially from overall firm-level earnings as well as have different valuation implications. Chen and Zhang (2003) show that

aggregated weighted average segment earnings, which they refer to as divergence of profitability, are incrementally persistent to consolidated earnings about future firm consolidated earnings. They also show that the aggregated segment component is important for firm valuation. This study differs from Chen and Zhang (2003), which focused on the pre-SFAS No. 131 period, in that we focus on the FSD component of earnings and whether it is informative beyond the aggregated segment earnings component subsequent to SFAS No. 131.

If the objective of SFAS No. 131 is successful in providing more useful (i.e., better earnings quality/predictability) information to investor, then ultimately we should find no (or less) mispricing. Accordingly, since FSDs represent the reconcilable earnings differences between what is reported using the 'management approach' and what is reported using 'GAAP' for consolidated earnings, the reconcilable difference would be the information (i.e., differences in recognizing revenue, allocating costs, unreportable segments, intersegment transactions, etc.) that exists between the two accounting measurement approaches. Consistent with SFAS No. 131's objective of segment information being more meaningful, we expect the FSD component of earnings to be persistent and have no (or lower) mispricing. Given the findings in prior research (e.g., Chen and Zhang, 2003), the aggregated segment component should be positive and significant. It is important to note that our tests are focused primarily on FSDs when they are not equal to zero, and we include aggregated segment earnings as an important within-firm control.

We use equation (1) to establish a benchmark for earnings persistence. Next, we determine whether the persistence of the FSD component of earnings is incremental to the aggregated segment component of earnings. If these components are equally persistent, then the

next period's earnings can be depicted equally by the bivariate model in equation (1) as it can be by the multivariate model in equation (2).

$$EARN_{t+1} = \alpha_0 + \alpha_1 EARN_t + \varepsilon_{t+1} \quad (1)$$

$$EARN_{t+1} = \beta_0 + \beta_1 AGSEG_t + \beta_2 FSD_t + \varepsilon_{t+1} \quad (2)$$

where, EARN is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG is the sum of segment operating profits excluding all corporate, reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD_t is firm-segment difference defined as EARN minus AGSEG.

The primary focus of this paper is to test whether the market correctly prices securities of firms with one or more reported segments relative to the persistence of aggregated segments and FSD components of earnings. Similar to Sloan (1996), Thomas (2000) and Hope et al. (2008), we use hedge portfolios to determine whether stock prices reflect the different properties of the FSD component of earnings. In other words, we examine whether investors can earn abnormal profits by following a trading strategy of going long (short) in firms with highest (lowest) FSD.[2]

We use an alternative naïve expectation model, against which to test the null hypothesis of market efficiency. Therefore, to test the rational expectations hypotheses, we employ the framework developed by Mishkin (1983) using equations (3) and (4). Mishkin (1983) suggests that equation (4) provides an estimate of the market's perceived time-series behavior of earnings.

[2]One can test whether the market is efficient with respect to earnings forecasts even if there are omitted variables. However, one cannot test whether the market is efficient with respect to specific variables in the forecasting equation (e.g., FSD) if the variables omitted from the forecasting equation are not (themselves) rationally priced and they are also correlated with the variables of interest in the forecasting equation (e.g., FSD). Based on the Mishkin Test (Mishkin, 1983), one can reject efficiency (at least with respect to the assumed equilibrium model of returns) even if the forecasting equation has omitted variables, but one cannot draw inferences about which accounting variable or variables are the source of the inefficiency. Given this and the findings in Kraft et al. (2007), we primarily focus our analysis in this study on hedge portfolio strategies similar to Thomas (2000) and Hope et al. (2008) to draw our conclusions with respect to market mispricing.

α_1^* in equation (4) is an estimate of the extent to which the market perceives earnings to persist in the future.

$$EARN_{t+1} = \alpha_0 + \alpha_1 EARN_t + \varepsilon_{t+1} \quad (3)$$

$$BHRET_{t+1} = \beta\ (EARN_{t+1} - \alpha_0 - \alpha_1^*\ EARN_t) + \varepsilon_{t+1} \quad (4)$$

where BHRET is the return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values; EARN is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6).

As discussed early in the paper, some argue that segment information reported under the SFAS No. 131 reporting regime is more useful while others argue that segment reporting now lacks comparability, consistency and refer to it as the 'unstandard standard'. To test whether investors fail to accurately distinguish between the aggregated segment and FSD (i.e., segment reconciliation) components of earnings, we test equations (5) and (6). Earnings expectations are permitted to reflect the overall level of persistence in earnings performance, but are hypothesized not to reflect the differential degrees of persistence attributable to the aggregated segment and FSD components of earnings. α_1^* in equation (6) is an estimate of the extent to which the market perceives aggregated segments component of earnings to persist in the future. α_2^* in equation (6) is an estimate of the extent to which the market perceives FSD component of earnings to persist in the future.

$$EARN_{t+1} = \alpha_0 + \alpha_1 AGSEG_t + \alpha_2\, FSD_t + \varepsilon_{t+1} \quad (5)$$

$$BHRET_{t+1} = \beta\ (EARN_{t+1} - \alpha_0^* - \alpha_1^* AGSEG_t - \alpha_2^* FSD_t) + \varepsilon_{t+1} \quad (6)$$

where BHRET is the return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the

buy-hold return on a value-weighted portfolio of firms having similar market values; EARN is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG is the sum of segment operating profits excluding all corporate, reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD is firm-segment difference defined as EARN minus AGSEG.

To test market efficiency, we compare coefficients ($\alpha_1 = \alpha_1^*$ and $\alpha_2 = \alpha_2^*$) from equations (5) and (6). This constraint assumes that stock prices correctly anticipate the average persistence of earnings performance. If the coefficients are not significantly different, then no mispricing occurs for these two components of earnings. The equality of the coefficients across equations is tested using the likelihood ratio statistic suggested by Mishkin (1983).

Kraft et al. (2007) indicate that it is important to include accounting variables while examining the rational pricing of earnings components in the Mishkin tests. Thus, we include variables used in Kraft et al. (2007) in equations (7)-(10).

$$EARN_{t+1} = \alpha_0 + \alpha_1 EARN_t + \Sigma\alpha_i CONTROL_i + \varepsilon_{t+1} \quad (7)$$

$$BHRET_{t+1} = \beta\,(EARN_{t+1} - \alpha_0 - \alpha_1^{*}\, EARN_t - \Sigma\alpha_i^{*} CONTROL_i) + \varepsilon_{t+1} \quad (8)$$

$$EARN_{t+1} = \alpha_0 + \alpha_1 AGSEG_t + \alpha_2\, FSD_t + \Sigma\alpha_i CONTROL_i + \varepsilon_{t+1} \quad (9)$$

$$BHRET_{t+1} = \beta\,(EARN_{t+1} - \alpha_0^{*} - \alpha_1^{*} AGSEG_t - \alpha_2^{*} FSD_t - \Sigma\alpha_i^{*} CONTROL_i) + \varepsilon_{t+1} \quad (10)$$

where CONTROL represents the control variables: SALES, CHSALES, CAPEX, and CHCAPEX. SALES is sales scaled by total assets (compustat #12/ compustat #6); CHSALES is the change in sales from t−1 to t scaled by assets ((compustat #12 – lag compustat #12)/ compustat #6); CAPEX is capital expenditures scaled by total assets (compustat #30/ compustat #6); CHCAPEX is the change in capital expenditures scaled by assets ((compustat #30 − lag

compustat #30)/ compustat #6). Because we use size-adjusted return as dependent variable, we do not include the decile as an independent variable as in Kraft et al. (2007).

Additionally, to test whether there is market mispricing or a shifting of risk, the relation between current FSDs and aggregated segment component of earnings and one and two year-ahead stock returns is estimated. If the abnormal returns in year t+1 are the result of the market failing to understand how FSDs in year t relates to total earnings in year t+1, then we should expect the market to correct fully for this mispricing when earnings in year t+1 are reported. If so, then abnormal returns should not persist beyond year t+1. If the abnormal returns are due to FSDs being a measure of risk, then these returns are likely to persist beyond year t+1. We assume market mispricing is more likely to cause only a short-term relation with abnormal returns as Thomas (2000). We use equations (11) and (14) to determine whether there is a mispricing or a shift or risk.

$$BHRET_{t+1} = \lambda_0 + \lambda_1 EARN_t + \varepsilon_{t+1} \quad (11)$$

$$BHRET_{t+1} = \mu_0 + \mu_1 AGSEG_t + \mu_2 FSD_t + \varepsilon_{t+1} \quad (12)$$

$$BHRET_{t+2} = \lambda_0 + \lambda_1 EARN_t + \varepsilon_{t+1} \quad (13)$$

$$BHRET_{t+2} = \mu_0 + \mu_1 AGSEG_t + \mu_2 FSD_t + \varepsilon_{t+1} \quad (14)$$

where, BHRET is calculated as the return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values; EARN is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG is the sum of segment operating profits excluding all corporate,

reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD is firm-segment difference defined as EARN minus AGSEG.

3 Sample Selection and Descriptive Statistics

Our initial sample include firms listed on Compustat's Annual Industrial, Research, and Full Coverage files and industry segment data available on Compustat's industry segment file from 1998 to 2006. We require the observations from the segment files only include the source year observations so that restatements of segment performance will not influence our results. The aggregated segment earnings (AGSEG) is defined as the sum of operating profit after depreciation (OPS) from all reported business segments scaled by total assets (compustat #6),

$$AGSEG = \sum_{i=1}^{n} OPS_i / TA \qquad (15)$$

where n represents the number of reported business segment of the firm. We exclude the observations when there is a foot note associated with OPS, since differences which exist between the data as reported by the company and the Compustat definition will be indicated by a footnote. The firm-level earnings (EARN) is defined as operating profit after depreciation from the annual Compustat file (compustat #178) scaled by total assets (compustat #6). The firm-segment reconcilable difference (FSD) is the difference of EARN and AGSEG.

Following the extant literature, we exclude firms in the financial and 'other' industry based on the industry classification in Fama and French (1997), firms that have data missing from the Compustat and CRSP databases. Firms must be covered in CRSP NYSE/AMEX capitalization deciles. We omit firms with mergers and acquisitions to allow appropriate comparisons. We also exclude observations where annual sale is less than 20 million. Since SFAS No. 131 is effective for fiscal years beginning after December 15, 1997, we exclude Compustat observations in 1998 if the firm's fiscal year ends in June – November. We exclude

observations with FSD equal to zero since the focus of this study is on the reconciliations between segment-level and firm-level earnings (i.e., FSDs). Our final sample selection criterion yields 649 unique firms and 1,717 firm-year observations.

Table 1 presents the sample descriptive statistics.[3] The variables are defined as follows: ROE is income before extraordinary tems over average equity (compustat #18 /average compustat #216 at t and t-1); ROA is return on assets (compustat #18 / average compustat #6 at t and t-1); TACC is total accrual scaled by total assets (((compustat #4-LAG(compustat #4)) - (compustat #5-LAG(compustat #5)) - (compustat #1-LAG(compustat #1)) + (compustat #34 - LAG(compustat #34)) - compustat #14)) / compustat #6); CFO is cash flow scaled by total assets ((compustat #18 – TACC) / compustat #6); LEVERAGE is leverage ratio defined as long-term debt over total assets (compustat #9 / compustat #6); GROWTH is firm's sales growth ((compustat #12- average compustat #12 at t and t-1)/LAG compustat #12); LOGSIZE is log of total assets (log (compustat #6)).

To determine whether the fact that FSDs are positive or negative plays a significant role, we perform our primary analysis by the sign of the FSD. We find that both negative and positive FSDs exist and are significant. Panel A of table 1 reports and compares the descriptive statistics for firms with FSD>0 and FSD<0. The mean of the positive FSDs are significant (mean = 0.020, t-value = 17.84). The mean of the negative FSDs are significant (mean = -0.028, t-value = -19.45). The two groups of firms do not differ significantly in terms of capital expenditures, total accruals, leverage and firm size. On the other hand, earnings, aggregated segment earnings, sales, return on equity, return on assets, operating cash flows, and firm growth are significantly greater for negative FSD firms. This suggests that firms that report aggregated segment earnings

[3] We winsorize all variables at the one percent and ninety-nine percent levels before we provide the statistics. The mean of FSD is different from the difference of the mean of EARN and the mean of AGSEG, because EARN, AGSEG, and FSD may not be winsorzed at the same time for one observation.

greater than firm-level consolidated earnings may be better off financially as a firm. Positive FSD firms are generally larger and have more total accruals.

Panel B of table 1 reports and compares the descriptive statistics for firms with FSD=0 and FSD≠0. The two groups of firms do not differ significantly in terms aggregated segment earnings, return on equity, total accruals, and firm leverage. Firms that report positive or negative FSDs tend to have more capital expenditures and are larger in size. However, they are less profitable, have less earnings, operating cash flows, sales, and firm growth than firms with no (i.e., zero) FSDs reported. Hence, on average, it appears that firms reporting FSDs not equal to zero may be a little less financially better off than firms with zero FSDs reported.

- Table 1 –

4 Empirical Analysis

Table 2 reports results from the estimation of equations (1) and (2) to establish the persistence in earnings performance and a benchmark for earnings mispricing. Consistent with prior research (e.g., Sloan, 1996), we find a significantly positive coefficient of 0.911 (0.914) on current period earnings in firms with positive (negative) FSDs. The results from the estimation of equation (2) show that both AGSEG and FSDs are incrementally persistent in providing information about future earnings. As shown in table 2, the AGSEG component coefficient of firms with positive FSDs is significantly positive (coefficient = .863, p-value <.0001). The FSD component is also significantly positive (coefficient = 1.178, p-value <.0001). These results indicate that both aggregated segment earnings and FSDs have significant implications for future firm consolidated earnings. However, only when firms report positive FSDs are AGSEG and FSD differentially persistent (0.863 versus 1.178). The coefficient of FSD for firms with FSD>0 is significantly larger than that of AGSEG for firms with positive FSDs (F-test = 38.15, p-value

<.0001). Our results suggest that the FSD component is more persistent than AGSEG component for firms with positive FSD. Although both the AGSEG and FSD are persistent and significantly positive (coefficient=.873, p-value <.0001; coefficient=.844, p-value <.0001, respectively), the coefficient on FSD component is not significantly different from that of the AGSEG component for firms with negative FSDs (F-test=.52, p-value=.470).

- Table 2 -

Table 3 reports the results for the estimations of equations (3)-(6). For firms with FSD>0 (FSD<0) in column 2 (3), the estimate of actual total earnings persistence (α_1) is .911 (.914) and the estimate of the market's perceived total earnings persistence is (α_1^*) is .847 (.822) in tests using equations (3) and (4). The difference in actual earnings persistence (α_1) and market's perception of earnings persistence (α_1^*) is not significant (p-value=.489 as FSD>0, p-value=.225 as FSD<0, respectively). Thus, the market appears to incorporate this earnings information into stock prices appropriately. For firms with FSD>0 (FSD<0) in column 4 (5), the estimate of aggregated segment earnings persistence (α_1) is .863 (.873) and the estimate of the market's perceived aggregated segment earnings persistence is (α_1^*) is .929 (.734) in tests using equations (5) and (6). The difference in aggregated segment earnings persistence (α_1) and market's perception of aggregate segment earnings persistence (α_1^*) is not significant (p-value=.533 as FSD>0, p-value=.178 as FSD<0, respectively). The estimate of FSDs persistence (α_2) is 1.178 (.844) and the estimate of the market's perceived FSDs persistence is (α_2^*) is -.151 (1.018) for FSD>0 (FSD<0) subset. For firms with FSD>0, the difference in FSDs persistence (α_2) and market's perception of FSDs persistence (α_2^*) is significant (p-value=<.0001). In contrast, for firms with FSD<0, the difference in FSDs persistence and market's perception of FSDs persistence is not significant (p-value=.543). These findings suggest that the market understands

and incorporates aggregated segment earnings and FSD components of earnings into stock prices appropriately when FSD<0. However, when firms report FSD>0, the results suggest that stock prices do not reflect accurately the time-series properties of FSDs. Specifically, securities prices underestimate the extent to which the FSDs persist thereby causing stock prices to lag earnings.

– Table 3 –

In table 4, we report the results of equations (7)-(10), in which control variables are included in the original Mishkin test equations. The results are consistent with those in table 3. Collectively, the results reported in table 3 and table 4 show that the market significantly underestimates FSD component when FSD>0. These empirical findings suggest that investors cannot properly interpret this management approach to segment financial reporting when FSD>0. Furthermore, potential opportunities may exist for market participants to earn abnormal profits as a result of this market mispricing.

– Table 4 –

Table 5 provides statistics on the characteristics of the decile portfolios formed by ranking firms on the value of the FSD component of earnings and reports the portfolio mean and median values for the buy-hold returns. Abnormal stock returns may be earned by exploiting investor's inability to distinguish correctly between the aggregated segment and FSD components of earnings. The economic significance of deviations from market efficiency can be assessed by examining the returns of a trading strategy based on the magnitude of the FSD component of earnings. Firms are ranked on the value of FSD component of earnings and assigned in equal numbers to ten portfolios each year. A separate abnormal return is then computed for each portfolio for the years in the sample, where the return cumulation period begins four months after the fiscal year in which FSDs are measured. Abnormal returns are

measured using size adjusted returns. If the market fixates on aggregated segment earnings, then those firms experiencing the largest FSDs are more likely to have undervalued stocks for firms with positive FSDs (i.e., FSD>0). Table 5 reports the size adjusted returns for the first year following portfolio formation. Portfolio abnormal returns increase from 6.69% for the lowest positive FSD portfolio to 40.39% for the highest positive FSD portfolio. Hence, the greater (i.e., more positive) the FSD the greater the abnormal returns. For firms with negative FSDs (i.e., FSD<0), the hedge portfolio produces statistically positive and significant abnormal returns which decrease from 27.59% for the lowest FSD portfolio to 4.95% for the highest FSD portfolio. In contrast to firms with positive FSDs, firms with negative FSDs experience decreasing abnormal returns as the value of the FSD become more negative. Figures 2 and 3 provide an illustration of the portfolio stock returns. The market returns in most portfolios are significantly different from zero and positive. Figure 4 combines Figures 2 and 3 as a continuum using the same 20 portfolios (from most negative to most positive FSD) to reveal a U-shaped distribution of returns.

– Table 5 –

– Figure 2 and Figure 3 and Figure 4–

Table 6 reports the returns to a hedge portfolio taking a long position in the highest value of FSD portfolio and an equally valued short position in the lowest value of FSD portfolio. For firms with positive FSDs (i.e., FSD>0), the returns to a hedge portfolio taking a long position in the highest portfolio and an equally valued short position in the lowest portfolio is 33.7% (t-value = 3.12, p-value = .0023). For firms with negative FSDs (FSD<0), the returns to a hedge portfolio taking a long position in the highest portfolio and an equally valued short position in the lowest portfolio is negative 22.6% (t-value = -2.03, p-value = .0438) for firms with negative

FSD. Our findings indicate that it is possible to make abnormal profits by following a trading strategy focused on the value of FSDs. Specifically, we find an economically meaningful and statistically significant positive return to going long in firms in the top deciles of the value of FSDs and going short in firms in the lowest deciles of the value of FSD component of earnings for firms with FSD>0. Moreover, most of the abnormal returns come from the long position, not the short position. In contrast, for firms with FSD<0, we find that the same trading strategy results in negative abnormal returns. This finding is mainly the result of the more significant abnormal returns occurring as negative FSDs are decreasing (lowest portfolio) rather than increasing (highest portfolio). Overall, our results suggest that market participants cannot adequately interpret the firm-to-segment reconciliations resulting from 'management approach' accounting information, thereby causing them to underestimate the significance of these reconciliations (i.e., FSDs).

– Table 6 –

Table 7 reports the results of equations (11) - (14): the mean coefficients of cross-sectional regressions of abnormal returns in year t+1 and t+2 on AGSEG and FSD components of earnings at year t. As shown for FSD>0, there is no significant relation between AGSEG in year t and abnormal returns in either t+1 or t+2. However, as FSD>0, the relation between FSD in year t and abnormal returns in year t+1 is significantly positive (coefficient = 2.051, p-value =.005). In contrast, for FSD>0, the relation between FSD in year t and abnormal returns in year t+2 is not significant (coefficient = .868, p-value =.183). The evidence suggests that the market misprices the persistence of positive FSDs in year t but then corrects fully for this mispricing in year t+1. For FSD<0, there is no statistically significant relation between stock returns and either AGSEG or FSD. It suggests that there is no mispricing for negative FSDs.

– Table 7 –

Although segment reporting under SFAS No. 14 is not the focus of this study, we also perform some additional analysis to determine whether mispricing occurred prior to the adoption of SFAS No. 131. We conduct the same analysis for the pre- and post-SFAS131 period and find, in untabulated results, that the market misprices, by underestimating, the FSD component of earnings in the pre-SFAS No. 131 period. The market underestimates the FSD component in firms with FSD>0, but not in firms with FSD<0, in the pre-SFAS No. 131 period. This result indicates that market mispricing occurs only for the FSD component of earnings in both pre- and post-SFAS No. 131 periods. This mispricing on the FSD component pre-SFAS No. 131 and on both the AGSEG and FSD post-SFAS No. 131 suggests no significant improvement in the information environment leading to decreased transparency in segment reporting in the post-SFAS No. 131.

5 Summary and Conclusions

Prior research has shown that in certain contexts the market does not fully interpret the extent to which current earnings persist into future earnings. As a result, stock prices predictably do not represent the firm value. This study contributes to the research by examining whether investors can earn abnormal returns using public information about firms' aggregated segment earnings and their firm-segment reconcilable differences. Overall, our empirical findings show that FSDs are generally incrementally persistent to the aggregated segments component of earnings. More importantly, we find that stock prices generally fail to fully reflect the information contained in the FSD component of current earnings when consolidated firm-level earnings is reported higher than aggregated segment earnings (i.e., FSD>0). This particular finding indicates that when firms report their aggregated segment earnings less than their firm

earnings, the market does not fully reflect this information and thereby misprices the importance of this information (i.e., reconciliation). This may suggest that market participants cannot adequately interpret the information provided in the FSD (which is essentially the reconciliation of aggregated segment earnings to firm earnings that is required as part of the management approach under the SFAS No. 131 segment reporting regime), thereby causing them to misprice the importance of this component of earnings. One plausible explanation is that the reconciliation that is being provided by companies is not sufficient for the market to disentangle the differences that exist in the reporting between firm 'GAAP' earnings measurement and segment 'management approach' earnings measurement (Caterpillar, Inc is a good example of this quandary), especially when firms report firm-segment differences greater than zero. For firms with negative FSDs (i.e., FSD<0), we find that the market understands and incorporates aggregated segment earnings and FSD components of earnings into stock prices appropriately.

Additionally, the results indicate that it is possible to make abnormal profits by following a trading strategy focused on positive FSDs where we find significantly positive returns to going long in firms in the top deciles of the value of FSDs and going short in firms in the lowest deciles of the value of FSD component of earnings. In contrast, for firms that report FSD<0, we find that the same trading strategy results in negative abnormal returns. Overall, our findings are consistent with the SEC's concern with regard to the proper reconciliation of segment information to the annually reported earnings. Our empirical findings, along with anecdotal findings, are also consistent with the critics that refer to SFAS No. 131 as the 'unstandard standard' and their inability to decipher segment earnings. Additional analysis also shows that the market does not misprice the aggregated segments or the negative FSD components of earnings prior to the adoption of SFAS No. l31.

A limitation of this study is that the analyses in this study are not exhaustive, and there are other avenues to explore in understanding segment disclosure and segment-to-firm reconciliations (i.e., FSD). Nonetheless, this study is the first to examine these reconciliations and further contributes to our understanding of segment disclosure practices by examining a unique setting in which management has discretion, based on how the firm in managed internally, to report segment information in a manner that may not be consistent with firm-level GAAP reported earnings measurements.

Appendix A
Caterpillar, Inc.
An Example of Reconcilable Differences between Firm-Level and Segment-Level Financial Information

We have developed an internal measurement system to evaluate performance and to drive continuous improvement. This measurement system, which is not based on generally accepted accounting principles (GAAP), is intended to motivate desired behavior of employees and drive performance. It is not intended to measure a division's contribution to enterprise results. The sales and cost information used for internal purposes varies significantly from our consolidated, externally-reported information resulting in substantial reconciling items. Each division has specific performance targets and is evaluated and compensated based on achieving those targets. Performance targets differ from division to division; therefore, meaningful comparisons cannot be made among the profit or service center divisions. It is the comparison of actual results to budgeted results that makes our internal reporting valuable to management. Consequently, we feel that the financial information required by Statement of Financial Accounting Standards No. 131 (SFAS 131) "Disclosures about Segments of an Enterprise and Related Information" has limited value for our external readers.

Due to Caterpillar's high level of integration and our concern that segment disclosures based on SFAS 131 requirements have limited value to external readers, we are continuing to disclose GAAP-based financial results for our three lines of business (Machinery, Engines, and Financial Products) in our Management's Discussion and Analysis beginning on page A-21.

Segment measurement and reconciliations

Please refer to Table V on Pages A-18 and A-19 for financial information regarding our segments. There are several accounting differences between our segment reporting and our GAAP-based external reporting. Our segments are measured on an accountable basis; therefore, only those items for which divisional management is directly responsible are included in the determination of segment profit/loss and assets. The following is a list of the more significant accounting differences:

. Generally, liabilities are managed at the corporate level and are not included in segment operations. Segment accountable assets generally include inventories, receivables, property, plant, and equipment.

. We account for intersegment transfers using a system of market-based prices. With minor exceptions, each of the profit centers either sells or purchases virtually all of its products to or from other profit centers within the company. Our high level of integration results in our internally reported sales being approximately doubles that of our consolidated, externally-reported sales.

- Segment inventories and cost of sales are valued using a current cost methodology.
- Timing differences occur between our internal reporting and our external reporting such as: postretirement benefit expenses and profit that is recognized on intersegment transfers.

Appendix A (Cont'd)

- Interest expense is imputed (i.e., charged) to profit centers based on their level of accountable assets. This calculation takes into consideration the corporate debt to debt plus equity ratio and a weighted-average corporate interest rate.
- In general, foreign currency fluctuations are neutralized for segment reporting.

- Accountable profit is determined on a pre-tax basis.

Reconciling items are created based on accounting differences between segment reporting and our consolidated, external reporting. Please refer to Table V on Pages A-18 and A-19 for financial information regarding significant reconciling items. Most of our reconciling items are self-explanatory given the above explanations of accounting differences. However, for the reconciliation of profit, we have grouped the reconciling items as follows:

. Corporate costs: Certain corporate costs are not charged to our segments. These costs are related to corporate requirements and strategies that are considered to be for the benefit of the entire organization.

. Methodology differences: See previous discussion of significant accounting differences between segment reporting and consolidated, external reporting.

. Methodology changes in segment reporting: Estimated restatements of prior periods to reflect changes in our internal-reporting methodology.

Appendix A (Cont'd)

Business Segments:

	Asia/ Pacific Marketing	Construction & Mining Products	EAME Marketing	Financing & Insurance Services	Latin America Marketing	Power Products	North America Marketing	All Other	Total
1998									
External sales and revenues...	$1,093	197	3,289	1,114	1,763	5,300	7,414	866	$21,036
Intersegment sales and revenues.....	$ 2	8,678	937	--	145	4,122	209	1,830	$15,923
Total sales and revenues.....	$1,095	8,875	4,226	1,114	1,908	9,422	7,623	2,696	$36,959
Depreciation and amortization.	$ 6	224	64	165	28	258	--	54	$ 799/1/
Imputed interest expense.....	$ 8	72	25	501	22	118	68	56	$ 870
Accountable profit (loss).....	$ (49)	1,090	211	201	85	410	118	191	$ 2,257
Accountable assets at Dec. 31.	$ 289	2,349	862	10,539	741	3,479	1,595	2,030	$21,884
Capital Expenditures.....	$ 26	292	72	--	19	349	--	88	$ 846/1/

/1/Amount differs from our consolidated, external reporting amount primarily because of service centers, which are not included in business segments.

Reconciliations:

	1998	1997	1996
Sales & Revenues			
Total external sales and revenues from business segments.....	$21,036	$18,987	$16,664
Other.....	(59)	(62)	(142)
Total consolidated sales and revenues...	$20,977	$18,925	$16,522
Profit before taxes			
Total accountable profit from business segments.....	$ 2,257	$ 2,522	$ 2,210
Corporate costs.....	(316)	(317)	(290)
Methodology differences.....	168	14	(122)
Methodology changes in segment reporting.....	--	119	107
Other.....	65	75	36
Total consolidated profit before taxes..	$ 2,174	$ 2,413	$ 1,941

Appendix A (Cont'd)

Consolidated Results of Operations for the Years Ended December 31

(Millions of dollars except per share data)

	Consolidated			Supplemental consolidating data					
				Machinery and Engines/1/			Financial Products		
	1998	1997	1996	1998	1997	1996	1998	1997	1996
Sales and revenues:									
Sales of Machinery and Engines (Note 1C)	$19,972	$18,110	$15,814	$19,972	$18,110	$15,814	$ --	$ --	$ --
Revenues of Financial Products (Note 1C)	1,005	815	708	--	--	--	1,117	839	732
Total sales and revenues	20,977	18,925	16,522	19,972	18,110	15,814	1,117	839	732
Operating costs:									
Cost of goods sold	15,031	13,374	11,832	15,031	13,374	11,832	--	--	--
Selling, general, and administrative expenses	2,561	2,232	1,993	2,210	1,932	1,715	377	324	302
Research and development expenses	643	528	410	643	528	410	--	--	--
Interest expense of Financial Products	489	361	295	--	--	--	501	373	316
Total operating costs	18,724	16,495	14,530	17,884	15,834	13,957	878	697	618
Operating profit	2,253	2,430	1,992	2,088	2,276	1,857	239	142	114
Interest expense excluding Financial Products	264	219	194	264	219	194	--	--	--
Other income (expense) (Note 3)	185	202	143	46	153	127	65	61	37
Consolidated profit before taxes	2,174	2,413	1,941	1,870	2,210	1,790	304	203	151
Provision for income taxes (Note 6)	665	796	613	554	724	558	111	72	55
Profit of consolidated companies	1,509	1,617	1,328	1,316	1,486	1,232	193	131	96
Equity in profit of unconsolidated affiliated companies (Note 10)	4	48	33	4	48	33	--	--	--
Equity in profit of Financial Products' subsidiaries	--	--	--	193	131	96	--	--	--
Profit	$ 1,513	$ 1,665	$ 1,361	$ 1,513	$ 1,665	$ 1,361	$ 193	$ 131	$ 96

/1/ Represents Caterpillar Inc. and its subsidiaries except for Financial Products, which is accounted for on the equity basis.

The supplemental consolidating data is presented for the purpose of additional analysis. See Note 1B on Page A-7 for a definition of the groupings in these statements. Transactions between Machinery and Engines and Financial Products have been eliminated to arrive at the consolidated data.

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Figure 1
Illustration of Firm-Segment Reconcilable Differences

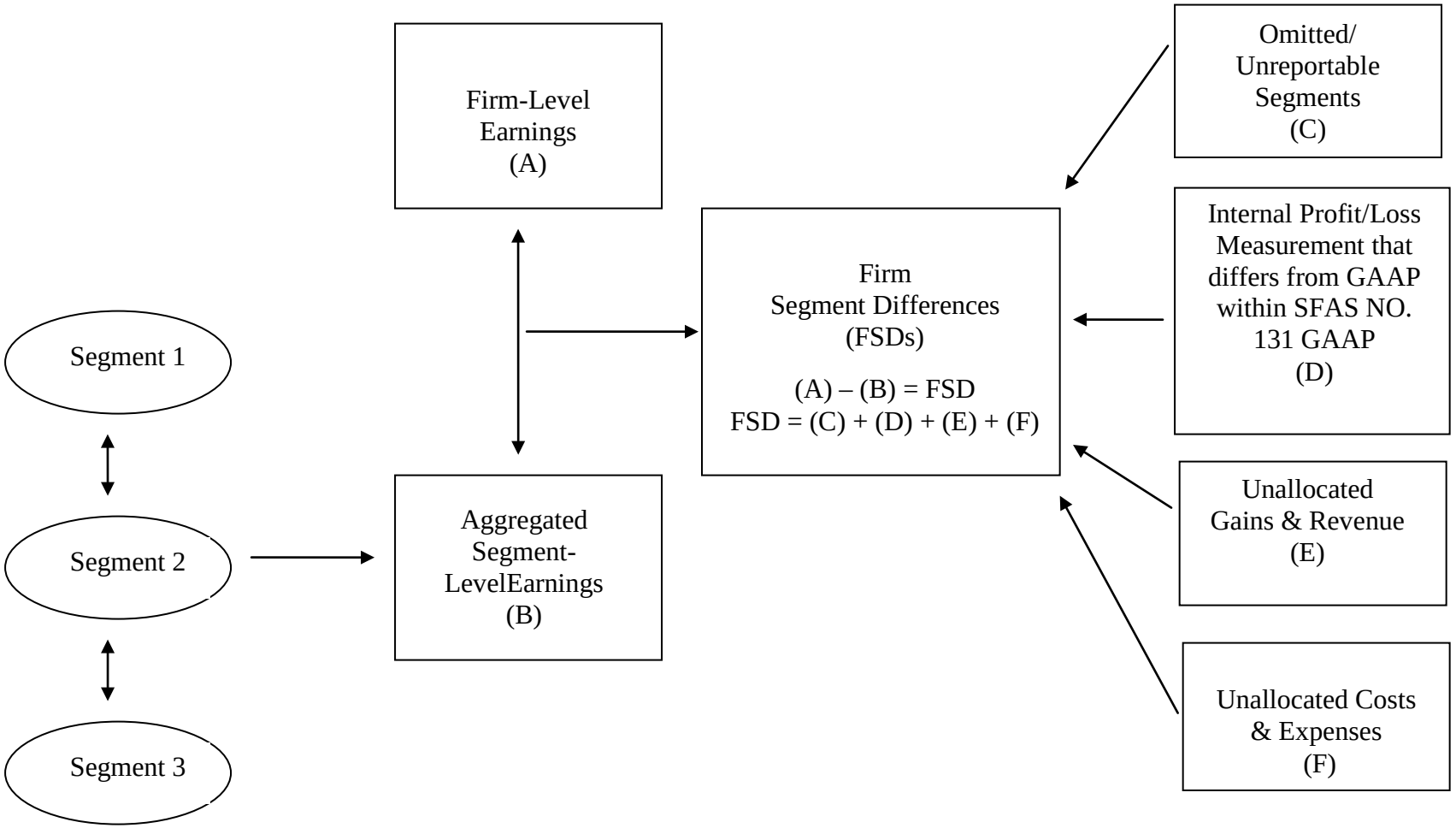
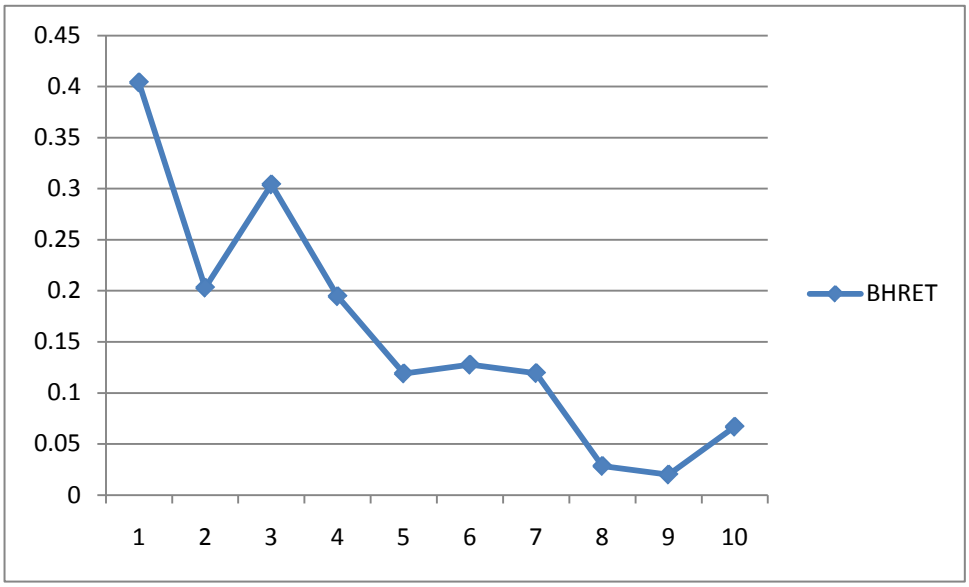
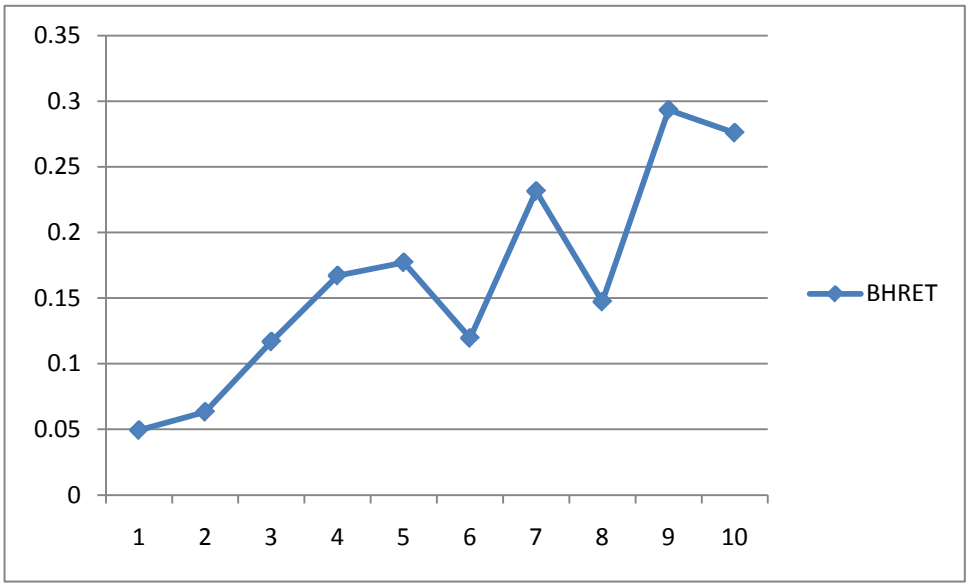


Figure 2: Hedge Portfolio Abnormal Returns: FSD>0



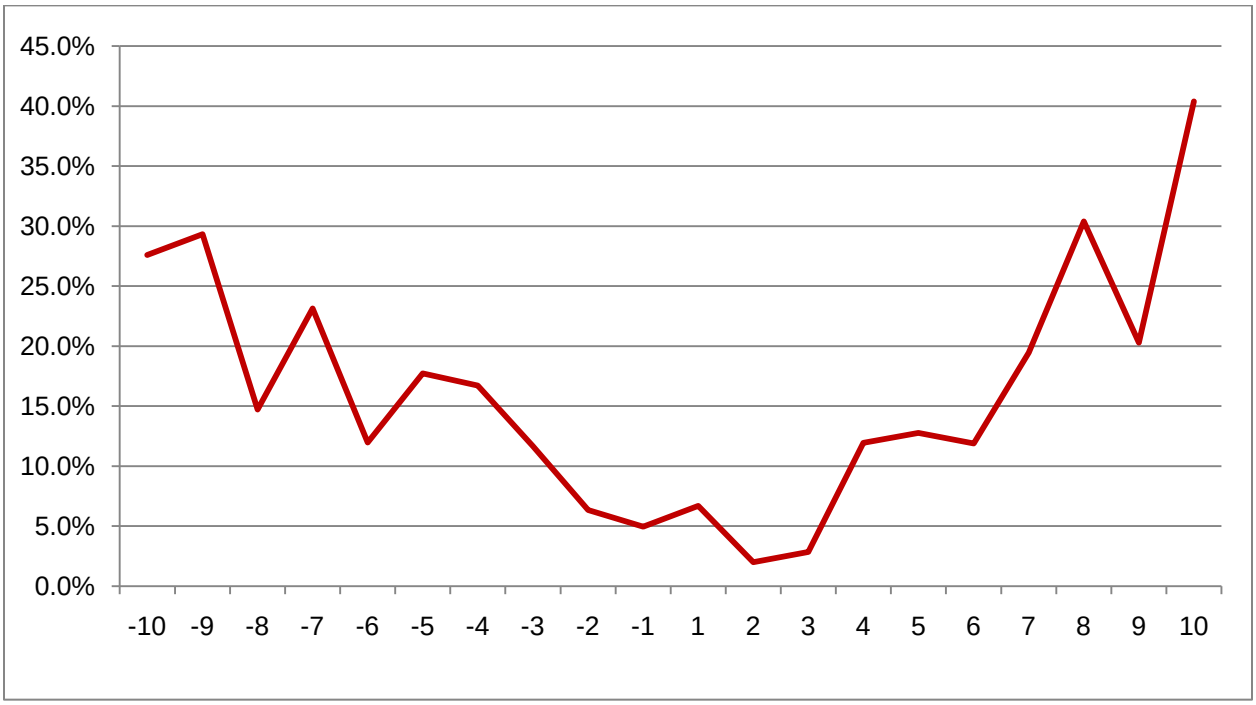
FSD is firm-segment difference defined as $EARN_t$ minus $AGSEG_t$. The size-adjusted returns (BHRET) are computed by taking the raw buy-old return, inclusive of dividends and liquidating distributions and subtracting the buy-hold return on a size matched, value-weighted portfolio of firms. The size portfolios are based on the market value of equity deciles of NYSE and AMEX firms. The decile rankings and decile returns are supplied by CRSP. The return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values.

Figure 3: Hedge Portfolio Abnormal Returns: FSD<0



FSD is firm-segment difference defined as $EARN_t$ minus $AGSEG_t$. The size-adjusted returns (BHRET) are computed by taking the raw buy-old return, inclusive of dividends and liquidating distributions and subtracting the buy-hold return on a size matched, value-weighted portfolio of firms. The size portfolios are based on the market value of equity deciles of NYSE and AMEX firms. The decile rankings and decile returns are supplied by CRSP. The return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values.

Figure 4: Hedge Portfolio Abnormal Returns: FSD<0 and FSD>0



FSD is firm-segment difference defined as $EARN_t$ minus $AGSEG_t$. The size-adjusted returns (BHRET) are computed by taking the raw buy-old return, inclusive of dividends and liquidating distributions and subtracting the buy-hold return on a size matched, value-weighted portfolio of firms. The size portfolios are based on the market value of equity deciles of NYSE and AMEX firms. The decile rankings and decile returns are supplied by CRSP. The return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values.

Table 1
Descriptive Statistics

Panel A: Descriptive Statistics for Firms with FSD<0 and FSD>0

	FSD>0					FSD<0					FSD>0 Minus FSD<0	
	N	Mean	Median	std	t Value	N	Mean	Median	std	t Value	t-value	Probt
EARN	788	0.072	0.068	0.071	28.16	929	0.080	0.072	0.077	31.71	-2.27**	0.024
AGSEG	788	0.052	0.055	0.084	17.33	929	0.110	0.096	0.089	37.91	-14***	<.0001
FSD	788	0.020	0.008	0.031	17.84	929	-0.028	-0.011	0.044	-19.45	26.27***	<.0001
SALES	788	1.106	0.956	0.728	42.67	929	1.208	1.049	0.799	46.11	-2.77***	0.006
CHSALES	788	0.015	0.021	0.192	2.2	929	0.038	0.044	0.222	5.15	-2.25**	0.025
CAPEX	788	184.964	53.676	389.128	13.34	929	192.580	53.250	421.720	13.92	-0.39	0.697
CHCAPEX	788	-0.002	0.000	0.030	-1.52	929	0.000	0.000	0.033	0.11	-1.14	0.256
ROE	788	0.028	0.078	0.314	2.47	929	0.090	0.105	0.306	8.95	-4.15***	<.0001
ROA	788	0.019	0.026	0.074	7.31	929	0.042	0.042	0.074	17.39	-6.5***	<.0001
TACC	716	-0.008	-0.001	0.063	-3.24	872	-0.002	0.001	0.056	-1.15	-1.8*	0.072
CFO	716	0.072	0.070	0.085	22.54	869	0.088	0.088	0.083	31.32	-3.9***	<.0001
LEVERAGE	787	0.246	0.240	0.177	39.09	929	0.237	0.212	0.182	39.71	1.01	0.311
GROWTH	788	0.039	0.031	0.172	6.36	929	0.064	0.052	0.193	10.18	-2.89***	0.004
LOGSIZE	788	7.160	7.100	1.728	116.33	929	7.004	7.074	1.748	122.15	1.85*	0.065

Table 1 (Cont'd)
Descriptive Statistics

Panel B: Descriptive Statistics for Firms with FSD=0 and FSD≠0

	FSD=0					FSD≠0					FSD=0 Minus FSD≠0	
	N	Mean	Median	std	t Value	N	Mean	Median	std	t Value	t-value	Probt
EARN	2,291	0.086	0.081	0.100	41.17	1,717	0.076	0.070	0.074	42.35	3.76***	0.0002
AGSEG	2,291	0.086	0.081	0.100	41.17	1,717	0.084	0.074	0.091	37.89	0.91	0.3638
FSD	2,291	0.000	0.000	0.000	.	1,717	-0.006	0.000	0.046	-5.74	5.74***	<.0001
SALES	2,291	1.231	1.061	0.893	65.96	1,717	1.161	1.009	0.768	62.63	2.64***	0.0083
CHSALES	2,291	0.055	0.045	0.227	11.64	1,717	0.027	0.033	0.209	5.39	4.04***	<.0001
CAPEX	2,291	153.247	25.376	360.537	20.34	1,717	189.085	53.600	406.987	19.25	-2.9***	0.0038
CHCAPEX	2,291	0.001	0.001	0.057	0.81	1,717	-0.001	0.000	0.032	-0.88	1.16	0.246
ROE	2,291	0.071	0.107	0.410	8.25	1,717	0.061	0.091	0.311	8.17	0.81	0.4195
ROA	2,291	0.043	0.043	0.095	21.53	1,717	0.032	0.033	0.075	17.57	4.08***	<.0001
TACC	2,145	-0.001	0.001	0.068	-0.58	1,588	-0.005	0.000	0.059	-3.12	1.81*	0.07
CFO	2,143	0.090	0.089	0.105	39.68	1,585	0.081	0.081	0.084	38.11	3.11***	0.0019
LEVERAGE	2,291	0.236	0.203	0.214	52.93	1,716	0.241	0.226	0.180	55.66	-0.8	0.4247
GROWTH	2,290	0.083	0.057	0.218	18.34	1,717	0.053	0.044	0.184	11.88	4.82***	<.0001
LOGSIZE	2,291	6.332	6.299	1.736	174.53	1,717	7.076	7.091	1.740	168.52	-13.41***	<.0001

Respectively ***, **, and * represent that p-statistics are significant at less than a <.01, .05, or .10 significance level. EARN is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG is the sum of segment operating profits excluding all corporate, reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD is firm-segment difference defined as EARN minus AGSEG; SALES is sales scaled by total assets (compustat #12/ compustat #6); CHSALES is the change in sales from t−1 to t scaled by assets ((compustat #12 – lag compustat #12)/ compustat #6); CAPEX is capital expenditures scaled by total assets (compustat #30/ compustat #6); CHCAPEX is the change in capital expenditures scaled by assets ((compustat #30 − lag compustat #30)/ compustat #6); ROE is income before extraordinary tems over average equity (compustat #18 /average compustat #216 at t and t-1); ROA is return on assets (compustat #18 / average compustat #6 at t and t-1); TACC is total accrual scaled by total assets (((compustat #4-LAG(compustat #4)) - (compustat #5-LAG(compustat #5)) - (compustat #1-LAG(compustat #1)) + (compustat #34 - LAG(compustat #34)) - compustat #14)) / compustat #6); CFO is cash flow scaled by total assets ((compustat #18 – TACC) / compustat #6); LEVERAGE is leverage ratio defined as long-term debt over total assets (compustat #9 / compustat #6); GROWTH is firm's sales growth ((compustat #12- average compustat #12 at t and t-1)/LAG compustat #12);LOGSIZE is log of total assets (log (compustat #6)).

Table 2

Persistence of Earnings, Aggregated Earnings, and Firm-Segment Difference

$$EARN_{t+1} = \alpha_0 + \alpha_1 EARN_t + \varepsilon_{t+1} \quad (1)$$

$$EARN_{t+1} = \beta_0 + \beta_1 AGSEG_t + \beta_2 FSD_t + \varepsilon_{t+1} \quad (2)$$

	Equation (1)				Equation (2)			
	FSD>0		FSD<0		FSD>0		FSD<0	
Variable	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**
Intercept	0.554	0.0024	0.101	0.4352	0.231	0.2178	-0.282	0.0591
EARN	0.911***	<.0001	0.914***	<.0001				
AGSEG					0.863***	<.0001	0.873***	<.0001
FSD					1.178***	<.0001	0.844***	<.0001
Obs.	788		929		788		929	
R-Square	0.785		0.791		0.785		0.765	
Adj R-Sq	0.784		0.79		0.784		0.765	
F Value: Equation	1432.58	<.0001	1751.23	<.0001	956.26	<.0001	1006.18	<.0001
F Value: AGSEG=FSD					38.15	<.0001	0.52	0.4703

Respectively ***, **, and * represent that p-statistics are significant at less than a <.01, .05, or .10 significance level. EARN is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG is the sum of segment operating profits excluding all corporate, reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD is firm-segment difference defined as $EARN_t$ minus $AGSEG_t$.

Table 3

Results of Market Efficiency Tests

$$EARN_{t+1} = \alpha_0 + \alpha_1 EARN_t + \varepsilon_{t+1} \quad (3)$$

$$BHRET_{t+1} = \beta\,(EARN_{t+1} - \alpha_0 - \alpha_1^{*} EARN_t) + \varepsilon_{t+1} \quad (4)$$

$$EARN_{t+1} = \alpha_0 + \alpha_1 AGSEG_t + \alpha_2 FSD_t + \varepsilon_{t+1} \quad (5)$$

$$BHRET_{t+1} = \beta\,(EARN_{t+1} - \alpha_0^{*} - \alpha_1^{*} AGSEG_t - \alpha_2^{*} FSD_t) + \varepsilon_{t+1} \quad (6)$$

	Equations (3) and (4)		Equations (5) and (6)	
Equation	**FSD>0**	**FSD<0**	**FSD>0**	**FSD<0**
α_1	0.911	0.914	0.863	0.873
α_1^{*}	0.847	0.822	0.929	0.734
α_2			1.178	0.844
α_2^{*}			-0.151	1.018
$\alpha_1=1$	26.18***	29.66***		
	<.0001	<.0001		
$\alpha_1=\alpha_1^{*}$	0.48	1.47	0.39	1.82
	0.489	0.225	0.533	0.178
$\alpha_2=\alpha_2^{*}$			19.61***	0.37
			<.0001	0.543
$\alpha_1=\alpha_1^{*}, \alpha_2=\alpha_2^{*}$			20.73***	4.88
			<.0001	0.087
Obs. Used	788	929	788	929

Respectively ***, **, and * represent that p-statistics are significant at less than a <.01, .05, or .10 significance level. EARN = is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG = is the sum of segment operating profits excluding all corporate, reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD = is firm-segment difference defined as EARN minus AGSEG. The size-adjusted returns (BHRET) are computed by taking the raw buy-old return, inclusive of dividends and liquidating distributions and subtracting the buy-hold return on a size matched, value-weighted portfolio of firms. The size portfolios are based on the market value of equity deciles of NYSE and AMEX firms. The return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values.

Table 4

Results of Market Efficiency Tests – with Control Variables

$$EARN_{t+1} = \alpha_0 + \alpha_1 EARN_t + \Sigma\alpha_i CONTROL_i + \varepsilon_{t+1} \quad (7)$$

$$BHRET_{t+1} = \beta\,(EARN_{t+1} - \alpha_0 - \alpha_1^{*} EARN_t - \Sigma\alpha_i^{*} CONTROL_i) + \varepsilon_{t+1} \quad (8)$$

$$EARN_{t+1} = \alpha_0 + \alpha_1 AGSEG_t + \alpha_2 FSD_t + \Sigma\alpha_i CONTROL_i + \varepsilon_{t+1} \quad (9)$$

$$BHRET_{t+1} = \beta\,(EARN_{t+1} - \alpha_0^{*} - \alpha_1^{*} AGSEG_t - \alpha_2^{*} FSD_t - \Sigma\alpha_i^{*} CONTROL_i) + \varepsilon_{t+1} \quad (10)$$

	Equations (7) and (8)		Equations (9) and (10)	
Equation	**FSD>0**	**FSD<0**	**FSD>0**	**FSD<0**
α_1	0.847	0.858	0.813	0.793
α_1^{*}	1.126	0.873	1.137	0.702
α_2			1.036	0.856
α_2^{*}			0.218	0.997
$\alpha_1=1$	44.22	40.86		
	<.0001	<.0001		
$\alpha_1=\alpha_1^{*}$	3.7	0.02	4.52	0.41
	0.055	0.889	0.033	0.521
$\alpha_2=\alpha_2^{*}$			4.34	0.23
			0.037	0.635
$\alpha_1=\alpha_1^{*}, \alpha_2=\alpha_2^{*}$			14.29	1.27
			0.001	0.530
Obs. Used	788	929	788	929

Respectively ***, **, and * represent that p-statistics are significant at less than a <.01, .05, or .10 significance level. EARN = is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG = is the sum of segment operating profits excluding all corporate, reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD = is firm-segment difference defined as EARN minus AGSEG. CONTROL represents the control variables: SALES, CHSALES, CAPEX, and CHCAPEX. SALES is sales scaled by total assets (compustat #12/ compustat #6); CHSALES is the change in sales from t−1 to t scaled by assets ((compustat #12 – lag compustat #12)/ compustat #6); CAPEX is capital expenditures scaled by total assets (compustat #30/ compustat #6); CHCAPEX is the change in capital expenditures scaled by assets ((compustat #30 − lag compustat #30)/ compustat #6). The size-adjusted returns (BHRET) are computed by taking the raw buy-old return, inclusive of dividends and liquidating distributions and subtracting the buy-hold return on a size matched, value-weighted portfolio of firms. The size portfolios are based on the market value of equity deciles of NYSE and AMEX firms. The return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values.

Table 5
Buy-Hold Returns of the Portfolios

		FSD>0 BHRET			FSD<0 BHRET	
Portfolio FSD Ranking	**N**	**Mean**	**t Value**	**N**	**Mean**	**t Value**
1(Highest)	76	0.4039	4.24***	91	0.0495	0.88
2	78	0.2030	2.4**	93	0.0634	1.03
3	79	0.3040	3.27***	93	0.1169	1.93*
4	81	0.1946	2.66***	93	0.1672	3.48***
5	79	0.1190	1.91*	92	0.1772	3.58***
6	79	0.1276	2.13**	96	0.1196	2.19**
7	82	0.1194	2.14**	94	0.2315	3.4***
8	78	0.0285	0.63	92	0.1473	2.34**
9	79	0.0201	0.48	94	0.2933	3.64***
10 (Lowest)	77	0.0669	1.31	91	0.2759	2.87***

The t-statistics are based o the time-series of the annual portfolio abnormal stock returns. FSD is firm-segment difference defined as $EARN_t$ minus $AGSEG_t$. The size-adjusted returns (BHRET) are computed by taking the raw buy-old return, inclusive of dividends and liquidating distributions and subtracting the buy-hold return on a size matched, value-weighted portfolio of firms. The size portfolios are based on the market value of equity deciles of NYSE and AMEX firms. The decile rankings and decile returns are supplied by CRSP. The return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values. The hedge portfolio consists of a long position in the highest value FSD portfolio and a short position in the lowest value FSD portfolio. Respectively ***, **, and * represent that p-statistics are significant at less than a <.01, .05, or .10 significance level.

Table 6
Buy-Hold Returns of the Portfolios

	Portfolio with Highest value of FSD (Portfolio 1) minus Portfolio with Lowest value of FSD (Portfolio 10)					
	FSD>0			FSD<0		
	mean	t-value	p-value	mean	t-value	p-value
BHRET	0.337	3.12***	0.0023	-0.226	-2.03**	0.0438
FSD	0.099	23.69	<.0001	0.1445	31.69***	<.0001
EARN	-0.009	-0.65	0.5176	0.0187	1.41	0.1616
AGSEG	-0.115	-7.79	<.0001	-0.145	-9.8**	<.0001

The hedge portfolio consists of a long position in the highest value of FSD and an offsetting short position in the lowest value of FSD. BHRET is calculated as the return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values; EARN is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG is the sum of segment operating profits excluding all corporate, reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD is firm-segment difference defined as $EARN_t$ minus $AGSEG_t$. Portfolios are formed annually by assigning firms into deciles based on the magnitude of FSDs in year *t*. The t-statistics are based o the time-series of the annual portfolio abnormal stock returns. The size-adjusted returns (BHRET) are computed by taking the raw buy-old return, inclusive of dividends and liquidating distributions and subtracting the buy-hold return on a size matched, value-weighted portfolio of firms. The size portfolios are based on the market value of equity deciles of NYSE and AMEX firms. The decile rankings and decile returns are supplied by CRSP. The return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values. Respectively ***, **, and * represent that p-statistics are significant at less than a <.01, .05, or .10 significance level.

Table 7
Future Buy-Hold Returns

Panel A: One-year Future buy-hold return

$$BHRET_{t+1} = \lambda_0 + \lambda_1 EARN_t + \varepsilon_{t+1} \quad (11)$$

$$BHRET_{t+1} = \mu_0 + \mu_1 AGSEG_t + \mu_2 FSD_t + \varepsilon_{t+1} \quad (12)$$

	FSD>0				FSD<0			
Variable	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**
Intercept	1.563	0.532	-0.063	0.980	-0.689	0.606	-1.568	0.290
EARN	0.142	0.612			-0.080	0.677		
AGSEG			-0.006	0.984			-0.188	0.330
FSD			2.051***	0.005			-0.927*	0.077
Obs.	311		311		440		440	
R-Square	0.0027		0.0281		0.0013		0.0081	
Adj R-Sq	-0.0038		0.0186		-0.0033		0.0012	
F Value	0.41	0.6622	2.97	0.0322	0.28	0.7562	1.18	0.316

Panel B: Two-year Future buy-hold return

$$BHRET_{t+2} = \lambda_0 + \lambda_1 EARN_t + \varepsilon_{t+1} \quad (13)$$

$$BHRET_{t+2} = \mu_0 + \mu_1 AGSEG_t + \mu_2 FSD_t + \varepsilon_{t+1} \quad (14)$$

			FSD>0				FSD<0	
Variable	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**	**Estimate**	**Pr > |t|**
Intercept	0.495	0.825	-0.141	0.951	1.295	0.349	0.191	0.901
EARN	0.117	0.643			0.035	0.863		
AGSEG			0.047	0.857			0.095	0.636
FSD			0.868	0.183			-0.488	0.369
Obs.	311		311		440		440	
R-Square	0.001		0.0061		0.0023		0.0078	
Adj R-Sq	-0.0054		-0.0036		-0.0022		0.001	
F Value	0.16	0.8505	0.63	0.5954	0.51	0.5993	1.14	0.3311

BHRET is calculated as the return accumulation period begins four months after the end of the fiscal year and size-adjusted returns are computed by measuring the buy-hold return in excess of the buy-hold return on a value-weighted portfolio of firms having similar market values; EARN is earnings before interest and taxes (compustat #178) scaled by firm total assets (compustat #6); AGSEG is the sum of segment operating profits excluding all corporate, reconciliation, and elimination segments scaled by firm total assets (compustat #6); FSD is firm-segment difference defined as EARN minus AGSEG.