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Follow the Leader: Cross-Industry Herding in Earnings Management

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A B S T R A C T

We employ Vector Autoregressions and quarterly financial statement data to explicitly test for both own- and cross-industry earnings management "spillovers". We find that earnings management behavior can transmit from one industry to another, similar industry. Further, we find an indirect, information-based channel whereby earnings management information may reach less-related industries with a lag of about six months. These results provide initial evidence that managers within similar industries "herd" in their discretionary accrual strategies. That is, earnings management in one sub-industry classification provides an informative signal to other industries. Others, then, follow suit by adopting like strategies either for competitive parity or purely wealth-maximizing purposes. In addition, we find that earnings management is persistent and does not mean-revert. Thus, earnings management can have long-term permanent impacts on a firm and its financial statements. This paper presents both methodological and policy implications for the academic accounting literature.

Keywords: Earnings Management, Accrual Strategy

Ⅰ. Introduction

Former SEC Chairman Levitt commented that earnings management was a “widespread” numbers game and that, if not addressed soon, would have adverse consequences for America’s financial reporting system (Levitt 1998). Chairman Levitt's warnings are particularly relevant given that some investors completely rely on firms' reported financial statements, at their face value, due to their inability to process more sophisticated (i.e., footnote) information. In this paper we examine two aspects of earnings management behavior. The first aspect is whether earnings management is (own) persistent or mean-reverting across time. The second aspect is whether, after controlling for own-persistency in earnings management, can earnings management in one industry "spillover" to another, related industry in a lead-lag fashion. Our results can help investors partially “undo” earnings management and hence have an unobstructed view of a firm's financial health.

Unlike the prior, disjoint literature on these two issues, this study uses a modeling framework which simultaneously allows for both own-to-own and cross-to-own earnings management impacts across time. Additionally, the modeling framework explicitly incorporates time-lags clarifying causality unlike prior literature which uses effectively-contemporaneous, instrumental variable, two-stage least squares approaches. Using our methodologically-correct approach, we find evidence of both own- and cross-earnings management spillovers across time.

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Specifically, we use quarterly oil and gas industry data from Compustat spanning 1975 (Q1) to 2013 (Q2). Our analyses center around two, highly-related industry classifications: the "oil and gas producing" (Main) sub-industry and the "supporting oil and gas" sub-industry (Port). In addition, a separate, less-related industry, "motor vehicles and equipment" (Other), is included in the analysis to contrast the more-closely-related industry results. The oil and gas industry is a critical component of the economy and it has great impact on capital markets. Although this industry is regulated, oil and gas companies have incentives to manage earnings to avoid regulatory intervention. For example, Han and Wang (1998) find evidence that oil companies manage earnings to avoid threats of political actions against them. In addition, oil and gas financial reporting is complex, and companies have incentives to manage earnings because auditors without industry specialization are less likely to detect their manipulation.

Earnings management is proxied by two accrual measures: absolute discretionary accruals and absolute total accruals. These measures are not only commonly used in the finance and accounting literature, they have also been recently adopted by the Securities and Exchange Commission (SEC) to detect earnings management in non-academic settings (Lewis, 2012). Firm-level accruals are then aggregated in an equally-weighted fashion into accrual indexes which allow for ease of computation and to control for firm-specific earnings management behavior.

From our empirical analysis, we find that all three accrual indexes exhibit strong, positive contemporaneous correlations indicating that accrual decisions tend to comove. This result indicates that firms tend to have a common earnings management component that could represent common-industry practices, common board interlinkages, the impact of GAAP, and so on. This contemporaneous finding does not represent a spillover mechanism but rather a common influencing factor on all three sub-industries' financial statements.

In contrast to the contemporaneous results indicating a common, but contemporaneous statement-influencing factor, our lead-lag analyses indicate clear evidence of cross-industry earnings management spillovers. Specifically, we use Vector Autoregression models with exogenous indicator variables included in the specifications (i.e. VAR-X). Each VAR-X model incorporates one lag of each accrual index and controls for potentially-biasing temporal effects (e.g. seasonality, decade effects, etc.) through the use of control indicator variables. Thus, the VAR-X models are able to examine, simultaneously, both own- and cross- industry interactions among the three accrual indexes. Our main inferential tool is "ordering-robust" Generalized Impulse Response Functions (GIRFs) estimated from the VAR-X results.

From the VAR-X and subsequent GIRF estimations, we find that earnings management is both own-persistent and influenced by cross-industry manipulation. With respect to finding own-persistency, these results imply that earnings management does not immediately mean revert in subsequent period as is typically believed in the prior literature using annual data.

These results suggest that an earnings management shock has a permanent impact on the firms' financial statements and, perhaps, on managerial decision making. It should be noted that own-accrual-persistency at the quarterly frequency does not necessarily refute the results of prior literature which uses annual frequencies. Rather, it implies that the prior literature may have been using an insufficiently-granular frequency to detect short-term earnings management persistency. Note that the own- persistency results are confirmed using standard autocorrelation functions.

With respect to the cross-industry results, we find that the closely-related oil and gas sub-industries have a significant, lead-lag impact on each other. These results, confirmed by using both discretionary and total accruals, indicate bi-directional earnings management spillovers among related industries. These effects are both statistically and economically significant, typically lasting for one quarter. Past one-quarter, the cross-impacts are negligible.

There is also evidence of unidirectional earnings management spillovers from both the Main and Port (more-related) industries to the Other (less-related) industry. These results, consistent across both discretionary and total accruals, typically occur over an extended period of time and are of less (economic) strength than the Main-to-Port and Port-to-Main spillovers. Taken together, these two results indicate that firms may be affected by the earnings management behavior in both closely-related and less-related industries. In the latter case, the less-related effects are weaker and take more time to be resolved.

All of our results provide consistent evidence to our study's main contribution to the extant literature of earnings management: earnings management "herding" exists. Specifically, earnings management in one industry sends an informative signal to other, similar industries of earnings "manipulation". Other industries then follow suit by similarly manipulating earnings. This herding effect may be explained by managers striving for competitive parity among industry peers or by opportunistic managers using industry-wide earnings management as "camouflage" for their own, wealth maximizing activities.

This paper continues in Section II with a review of the extant literature regarding earnings management. Then, Section III details our study's dataset and empirical methodology. Section IV describes empirical results and their implications. Section V provides a discussion of the results and avenues for future research while Section VI provides concluding remarks.

Ⅱ. Literature Review

Whether discretionary accruals persist or mean-revert across time is an important issue given that persistent discretionary accruals imply that earnings management decisions can have long-term or even permanent influences on a firm's financial statements and, by extension, managerial decisions in the future. In addition, persistent earnings management may allow managers to extract value from earnings management without necessarily causing harm to their firm's long-term financials. We now address some of the extant literature regarding earnings management, its persistency, and its cross-industry impacts.

Most of the prior literature finds that discretionary accruals have time persistency. This may be explained by discretionary accruals possessing information content above and beyond that of non-discretionary accruals (Haw et al., 2001) or that firms within a common industry tend to engage in similar income smoothing practices (Dechow, 1994; DeFond and Park, 1997; Dechow et al., 1998). However, others such as Xie (2001) find that discretionary accruals show little to no own-persistency across time. These viewpoints may be bridged by Kao (2007) who finds that discretionary accrual persistency is dependent on the informativeness of firm investors. In line with Haw et al. (2001), conditional accrual persistence may be explained by informed investors being attracted to firms with highly informative (persistent) accruals. Uninformed investors, however, are unable to distinguish between informative and non-informative discretionary accruals thus leading to non-persistent accruals.

With respect to cross-to-own earnings management spillovers, a.k.a. earnings management herding, inter-industry accounting measure-correlation is typically high due to similar firm operating characteristics and economic environments (Magee, 1974). This measure- correlation facilitates inter-industry transfers of information which may lead to common accounting decisions among constituent firms (Pyo and Lustgarten, 1990; Freeman and Tse, 1992). In fact, previous literature finds that significant cross-industry accrual autocorrelation exists (Haw et al., 2001) especially among firms with high accounting measure correlation (Park and Ro, 2004).

Trueman (1990) explains this by noting that managers have a stronger incentive to perform earnings management in higher measure-correlated industries because investors believe that subsequent earnings releases by a firm will likely to be in line with industry standards. Thus, high industry correlations allow earnings management under a more externally opaque information environment. Further, accounting managers in highly correlated industries are more likely to delay earnings announcements until seeing the rest of the industry's performance. This delaying tactic gives managers the ability to more confidentially perform earnings management without being detected as an industry outlier (Park and Ro, 2004).

In a recent paper, Chiu, et al. (2013) find that earnings management spreads from firm to firm via board connection of shared directorship. Thus, standard accounting and earnings management practices provide both information and camouflage in measure-correlated industries. Another study by Tse and Tucker (2010) empirically examines managers' herding behavior on information disclosure using quarterly earnings warning events from 1993 to late 2004. They find evidence that managers tend to time their earnings warnings to occur soon after peer firms' warnings. Using this clustering strategy, managers understate the role of firm-specific factors in earnings shortfalls, thus managers can minimize their apparent responsibility for earnings shortfalls.

These byproducts of common industry practices gives managers an incentive to engage in earnings management herding whereby one member within the industry undertaking earnings management allows others within the industry (and across similar industries) to follow suit. This earnings management herding is the focus of the present study.

Ⅲ. Methodology

This study focuses on three separate, but differentially-related sub-industries. The first sub-industry is entirely made up of firms in "crude petroleum and natural gas production" (SIC #1311). This represents what is likely the most "influential" sub-industry and whose firms make up the Main portfolio. The second-most-related sub-industry includes firms in "drilling oil and gas wells" (SIC #1381), "oil and gas field exploration services" (SIC #1382), and "other oil

and gas field services" (SIC #1389). These firms make up the Port portfolio. The third, less-related sub-industry is composed of firms that produce motor vehicles and equipment including "motor vehicles and passenger car bodies" (SIC #3711), "truck and bus bodies" (SIC #3713), "motor vehicle parts and accessories" (SIC #3714), "truck trailers" (SIC #3715), and "motor homes" (SIC #3716). These firms make up the Other portfolio.

We choose the oil and sub-industries as our main foci of research for two, primary reasons. The first is that the oil and gas sub-industries have an abundance of past financial statement information. This is important given that calculating discretionary accruals requires complete financial statements and that our empirical approaches require long datasets. Other candidate industries do not have the same completeness of data or the same length. The second reason is that the oil and gas industry is a prolific user of earnings management, especially during politically sensitive times. It would not make sense to study earnings management in general, or herding in particular, by using industries that use earnings management infrequently.

Quarterly data is pulled exclusively from COMPUSTAT spanning 1975-Q1 to 2013-Q2 where the first three quarters are unaudited. We use quarterly data in this study, as opposed to the standard annual data, for three main reasons. The first is to allow for a sufficient number of sample points in the empirical analysis. This fact is especially important given that we use time-series econometric methods that benefit from longer sample lengths. Second, quarterly data reveals a greater degree of earnings management. The reason behind this is that quarterly statements often go unaudited. As a result, managers are more likely to manipulate earnings without the fear of detection on a quarterly, as opposed to annual basis (Jeter and Shivakumar, 1999).

The third reason we use quarterly data deals with data granularity. Specifically, managerial decisions regarding earnings management occur on a daily basis. Using annual data masks these high-frequency decisions by "averaging out" these decisions over time. This is especially true given that earnings management is not a sustainable activity and must, at some point, revert. Thus, we opt for the more-granular quarterly frequency so that the amount of managerial decision masking is minimized.

We use two proxy variables to detect earnings management: total accruals (TA) and discretionary accruals (DA). For years starting from 1988, TAs are calculated based on cash flow statements and is the difference between net income and operating cash flows. Since firms are not required to disclose cash flow statements until 1988, TAs before year 1988 are based on balance sheet statements. Specifically, TAs are calculated as follows (firm and time subscripts omitted for convenience):

$$TA = \Delta CA - \Delta CL - \Delta Cash + \Delta CDebt - Dep \quad (1)$$

where CA is current assets, CL is current liabilities, Cash is cash and cash equivalents, CDebt is current debt, and Dep is depreciation and amortization expense.

Discretionary accruals (DA) are estimated using the cross-sectional Modified Jones Model (Jones 1991, Dechow et al. 1995) where discretionary accruals are the difference between total accruals and the fitted values of nondiscretionary accruals using coefficient estimates from the following equation estimated by industry and quarter (firm subscripts omitted for convenience):

$$\left(\frac{TA_t}{A_{t-1}}\right) = \beta_0\left(\frac{1}{A_{t-1}}\right) + \beta_1\left(\frac{(\Delta S_t - \Delta R_t)}{A_{t-1}}\right) + \beta_2\left(\frac{PPE_t}{A_{t-1}}\right) + \varepsilon_t \quad (2)$$

where A is the beginning quarter's total assets, S is net revenues, R is accounts receivables, and PPE is gross property, plant, and equipment.

Non-discretionary accruals (NDA) are calculated as the conditional expected value for each firm using OLS regression estimates while discretionary accruals (DA) are calculated as the difference in TAs and NDAs. Note that each of the two types of accruals used in this study are non-performance-matched. We perform a robustness check on all of our results using performance-matched accruals given that performance-matched discretionary accruals reduce the likelihood of our results being affected by accrual model specification. We find that our performance-matched results are qualitatively similar to our non-performance-matched results. After calculating the (signed) TA and DA for each firm, we then take the absolute value of each firm-quarter's accruals and construct an equally-weighted accruals index for each sub-industry (Main, Port, and Other). This is done for both TA and DA, separately.

While other studies model accruals as functions of their (own) lagged values, they do not explicitly model DAs as a function of cross-industry accruals. To remedy this shortfall, we model all three sub-industry accrual indexes into a Vector Autoregressive framework with exogenous indicator variables included in each model (i.e. a VAR-X). Thus, the empirical model is represented as follows:

$$\begin{aligned} |DA_{Main,t}| &= \alpha_{1,1} + \beta_{1,1}|DA_{Main,t-1}| + \beta_{1,2}|DA_{Port,t-1}| \\ &+ \beta_{1,3}|DA_{Other,t-1}| + \sum \theta_{1,k} D_{k,t} + \varepsilon_{1,t} \end{aligned} \quad (3a)$$

Figure 1. Absolute Discretionary Accruals |DA| Plots

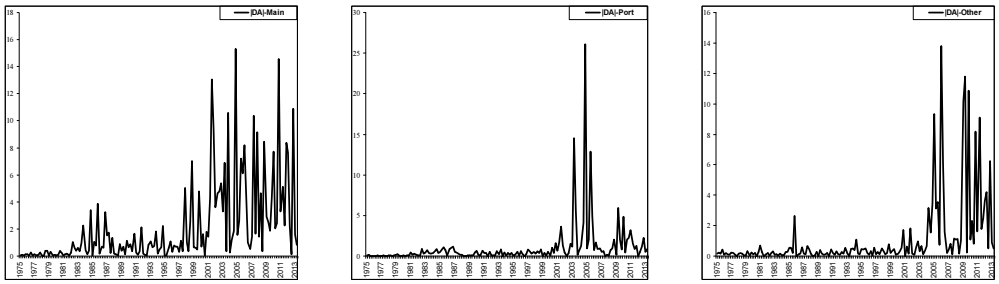
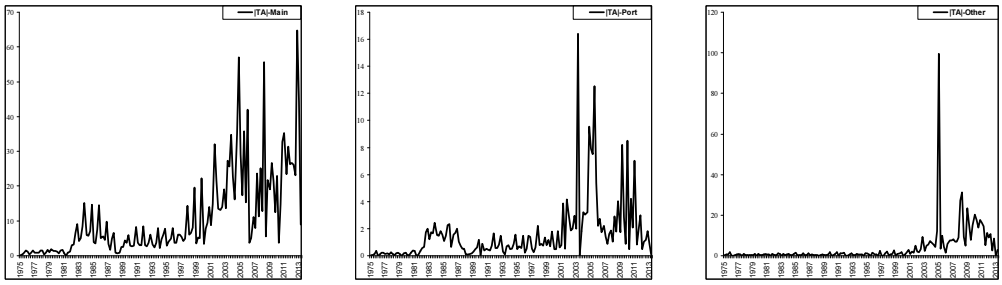


Figure 2. Absolute Total Accrual|TA| Plots



$$| DA_{Port,t} | = \alpha_{2,1} + \beta_{2,1} | DA_{Main,t-1} | + \beta_{2,2} | DA_{Port,t-1} | + \beta_{2,3} | DA_{Other,t-1} | + \sum \theta_{2,k} D_{k,t} + \varepsilon_{2,t} \quad (3b)$$

$$| DA_{Other,t} | = \alpha_{1,1} + \beta_{1,1} | DA_{Main,t-1} | + \beta_{1,2} | DA_{Port,t-1} | + \beta_{1,3} | DA_{Other,t-1} | + \sum \theta_{1,k} D_{k,t} + \varepsilon_{1,t} \quad (3c)$$

The $\beta_{i,i}$ coefficients measure accrual persistency (i.e. own-to-own behavior) while the $\beta_{i,j}$ and $\beta_{j,i}$ coefficients measure cross-industry accrual spillovers. Given the VAR framework, error terms $\varepsilon_{i,t}$ are allowed to interact and thus take into account intra-equation dynamics. A similar model is estimated based on total, as opposed to discretionary, accruals.

In addition to the own- and cross-accrual variables, indicator variables are included to account for temporal effects such as changes in accounting standards over time (i.e. decade dummy variables), the recent financial crisis, and for the fourth quarter of each year. The Q4 indicator variable is included in each equation of each model to account for the possibility that accruals are noisier in the fourth quarter relative to other quarters (Jeter and Shivakumar, 1999). Thus, any results from our VAR-X models will be free of any seasonally-induced noise in the accrual variables.

This study's main inferences come from the statistical and economic significance of own-to-own and cross-to-own Generalized Impulse Response Functions (GIRFs) time paths. GIRFs are preferred over traditional Impulse Response Functions given that GIRFs are robust to variable orderings (Enders, 2004).

As seen in Figures 1 and 2, the absolute value of both total and discretionary accruals (for all three sub-industry indexes) exhibit significant volatility in the second half of the dataset. In an unreported robustness analysis, we include

Table 1. Contemporaneous Accrual Correlations

	Main vs. Port		Main vs. Other		Port vs. Other	
	|DA|	|TA|	|DA|	|TA|	|DA|	|TA|
Corr.	0.511	0.556	0.422	0.437	0.213	0.413
p-Value	0.000	0.000	0.000	0.000	0.008	0.000

an indicator variable into each specification equal to one if the given series is greater than its average. Results indicate that the earnings management spillover effects are still present even after controlling for potential outlier and volatility issues.

IV. Empirical Results

We first discuss our correlation analyses for the three sub-industry accrual indexes. From Table 1, we find that all three indexes are correlated both statistically and economically. These results hold whether we are testing discretionary or total accruals. Additionally, while not formally tested, we find that the Main and Port indexes are more associated on a contemporaneous basis (0.511) than the Main/Other (0.422) and Port/Other (0.213) relationships.

The correlation results indicate that earnings management behavior tends to comove among related industries. Further, the strength of this contemporaneous relationship is higher for more-closely related industries (i.e. Main vs. Port) and weaker for less-related industries (i.e. Main vs. Other and Port vs. Main). Taken together, one or more common, contemporaneous components exist in earnings management behavior. A possible driver of this earnings management comovement may be, for example, common accounting practices within the various industries, the impact of nation-wide practices such as GAAP or, perhaps, the effect of common governing boards.

While we leave the issue of earnings management comovement and its determinants to future work, we note two implications of the correlation analysis. First, the results are consistent both qualitatively and quantitatively, regardless of whether we use total or discretionary accruals. Thus, our subsequent, lead-lag results should be fairly consistent whether we use total or discretionary accruals. Second and more importantly, our finding of earnings management comovement does not necessarily negate or diminish our subsequent of lead-lag earnings management behavior. Specifically, while earnings management comovement is likely being driven by common industry practices, cross-industry, lead-lag behavior is not.

Tables 2 and 3 report accrual autocorrelation functions (ACF) for the three accrual indexes. We find evidence of both total and discretionary accruals persistency (momentum) across all indexes. Prior accounting literature indicates that earnings management is a mean-reverting process wherein use of discretionary accruals leads to a shock in the opposite direction in the next time period. This mean-reversion property is important in that earnings management is not thought to permanently alter a firm's financial statements. This, consequently, has implications for issues of earnings quality, managerial compensation, and other accounting-related issues.

Thus, our finding of earning management persistency may, at first, seem like a major refuting of decades of accounting literature or that our data processing efforts created erroneous results. Yet, upon further reflection, our results do not necessarily run counter to the prior literature. Rather, our results point to the impact of data granularity.

Table 2. Absolute Discretionary Accrual Autocorrelation Functions

	Main |DA|			Port |DA|			Other |DA|	
Lag	ACF	Q-Stat	p-Value	ACF	Q-Stat	p-Value	ACF	Q-Stat	p-Value
1st	0.260	10.6	0.001	0.225	8.0	0.005	0.331	17.2	0.000
2nd	0.312	26.0	0.000	0.083	9.0	0.011	0.403	42.9	0.000
3rd	0.265	37.2	0.000	0.319	25.3	0.000	0.276	55.1	0.000
4th	0.524	81.2	0.000	0.144	28.6	0.000	0.381	78.3	0.000

Table 3. Absolute Total Accrual Autocorrelation Functions

	Main |TA|			Port |TA|			Other |TA|	
Lag	ACF	Q-Stat	p-Value	ACF	Q-Stat	p-Value	ACF	Q-Stat	p-Value
1st	0.592	55.1	0.000	0.366	21.0	0.000	0.309	15.0	0.000
2nd	0.556	104.0	0.000	0.444	52.1	0.000	0.253	25.2	0.000
3rd	0.506	144.7	0.000	0.426	80.9	0.000	0.253	35.3	0.000
4th	0.576	197.8	0.000	0.306	95.9	0.000	0.257	45.9	0.000

Specifically, managerial decisions within a given firm are actually real-time events that are never fully or accurately captured with data that, relative to a decision, has "arbitrary" beginning and ending dates. For example, the timing information of a managerial decision made on, say, November 1st, is completely lost when data is reported across the entire calendar-year. However, use of more-granular data, e.g. quarterly data, may be able to capture the timing of the managerial decision.

Thus, while the extant accounting literature notes that earnings management behavior reverts across time, it must be remembered that most of the prior literature uses highly-aggregated, yearly data. This literature rarely captures intra-year earnings management behavior. Thus, it's entirely possible that earnings management exhibits persistency or momentum over short-time frames (as we have found) and yet exhibits mean-reversion over longer time-frames.

Additionally, it should be noted that we are not using signed accruals but rather the absolute value of signed accruals. Our accrual variables thus measure the information content of earnings management. Thus, our use of absolute accruals is similar to how the academic finance literature uses absolute returns to proxy for returns volatility and, hence, information arrival.

We make these notes for two reasons. The first is that we are not claiming that our results run counter to the extant literature, nor have we found (or claim to have found) a new accounting phenomena. Rather, we simply show earnings management behavior on a more refined scale. Second, we stress that an analysis using our methodology but with less-granular data (i.e. annual data) may not capture earnings management spillovers. Yet, finding such results would not necessarily disprove our results. Rather, it may be that an annual analysis would gloss over high-frequency phenomena.

Beyond the earnings management implications noted above, earnings management persistency at the quarterly level has a very important, technical and methodological implication. Specifically, when persistency is present, it would be inappropriate to analyze simple measures of (unconditional) cross-correlation. Doing may bias the results given that a confounding factor (i.e. persistency) goes unaccounted for. Thus, our finding of earnings management persistency provides an important warning to those conducting examinations of cross-industry spillovers: take into account of own-persistency. Our VAR-X methodology does exactly that.

Figure 2 plots the Generalized Impulse Response Functions (GIRFs) calculated from a VAR-X model of Main, Port, and Other absolute discretionary accrual indexes from 1975-Q1 to 2013-Q2. As noted previously, indicator variables are included in the specification to account for temporal shifts in earnings management behavior, the recent financial crisis, and fourth quarter seasonal effects. The diagonal GIRF plots examine own-to-own earnings management behavior. Each plot, specifically, describes by how many standard deviations industry i will change for a one standard deviation change in industry i (i.e. an own-effect). As is seen, all three sub-industry accruals indexes exhibit sharp earnings management increases in the quarter following an increase in that industry's discretionary accruals. For example, a one standard deviation increase in the Main industry's absolute discretionary accruals leads to an approximate 2.25 standard deviation increase in the following quarter. Note, that all three on-diagonal plots show a similar standard deviation increase, given an own-accruals shock. This fact indicates that own-accrual impacts are fairly ubiquitous among industries.

Thus, from the diagonal plots we find evidence that absolute discretionary accruals exhibit short-term persistence. This persistence is both statistically and economically significant. However, the accruals momentum is short-lived in that subsequent quarters are not impacted. We can see this in each plot given that all three on-diagonal GIRFs are not statistically (or, economically, for that matter) significant. These results provide confirmatory evidence that, even after controlling for potential cross-industry effects, earnings management can persist for very short amounts of time.

As noted above, these results are important own their own that they point to a possible inadequacy of the prior accounting literature: insufficiently granular datasets. Further, these results confirm our warning that cross-industry earnings management should only be studied after holding own-industry effects constant. Finally, the own-effects do not rebound as would be expected from a reversal in earnings. As in Boschen et al. (2003), the above results suggest that a less-than-unity component of earnings management embeds itself into earnings permanently.

While the on-diagonal results from Figure 2 are important in their own right, the off-diagonal plots are of key importance in our study. Specifically, each off-diagonal GIRF plot examines cross-industry earnings management spillovers where plot i,j describes by how many standard deviations industry j will change for a given one standard deviation change in industry i. For example, plot {2,3} examines the GIRF time-path of a one standard deviation increase in the Port index onto the Main index. Here, the Main index experiences an (almost) one standard deviation increase in absolute discretionary accruals which dies off to zero, economically and statistically, in subsequent quarters.

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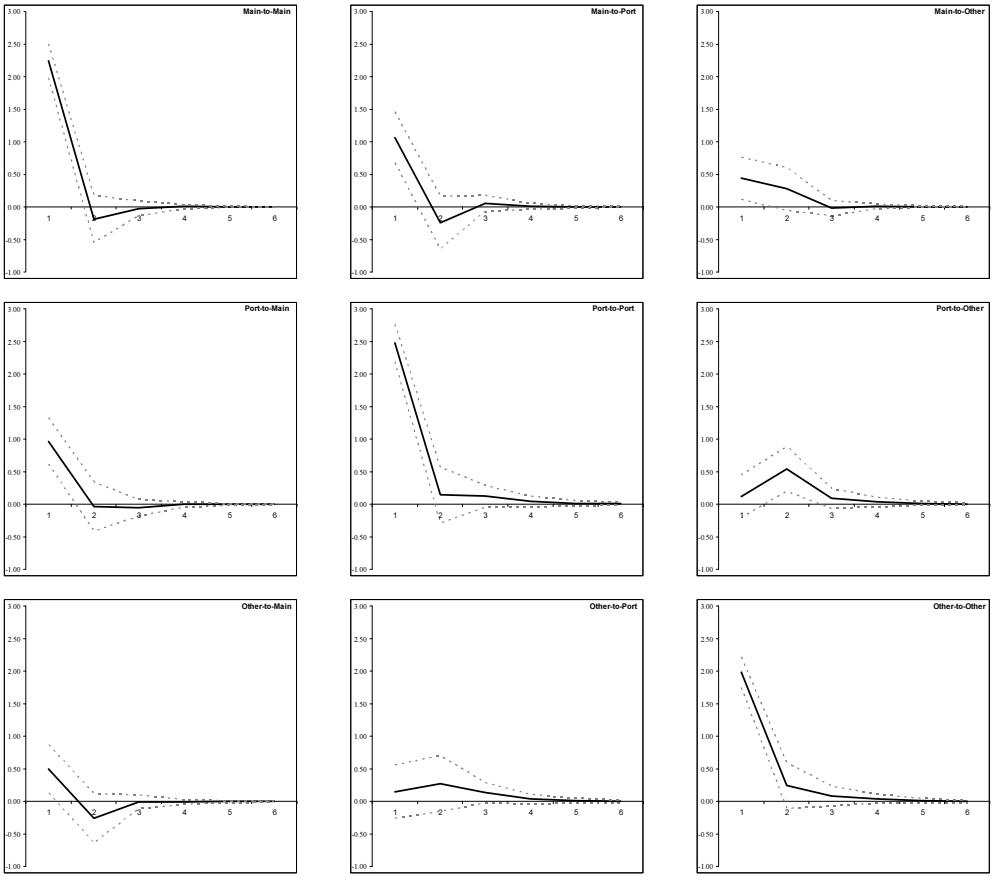
Examining the off-diagonal plots, the immediately-striking feature is that there are statistically- and economically-significant cross-accrual spillovers among the three industries. Looking first at the Main and Port relationships, we find that a one standard deviation increase in the Main industry in Quarter Zero leads to an almost one standard deviation increase in the Port industry's absolute discretionary accruals in the next quarter (i.e. Quarter One). Then, in a manner similar to the own-accrual impacts, the cross-industry effects die off and are insignificant in subsequent quarters. We see this same relationship for the Port-to-Main interaction. What's also striking is that both cross-industry effects are of the same, approximate impact indicating a type of symmetry in accrual spillovers between

Figure 2. General Impulse Response Function Plots: Absolute Discretionary Accruals



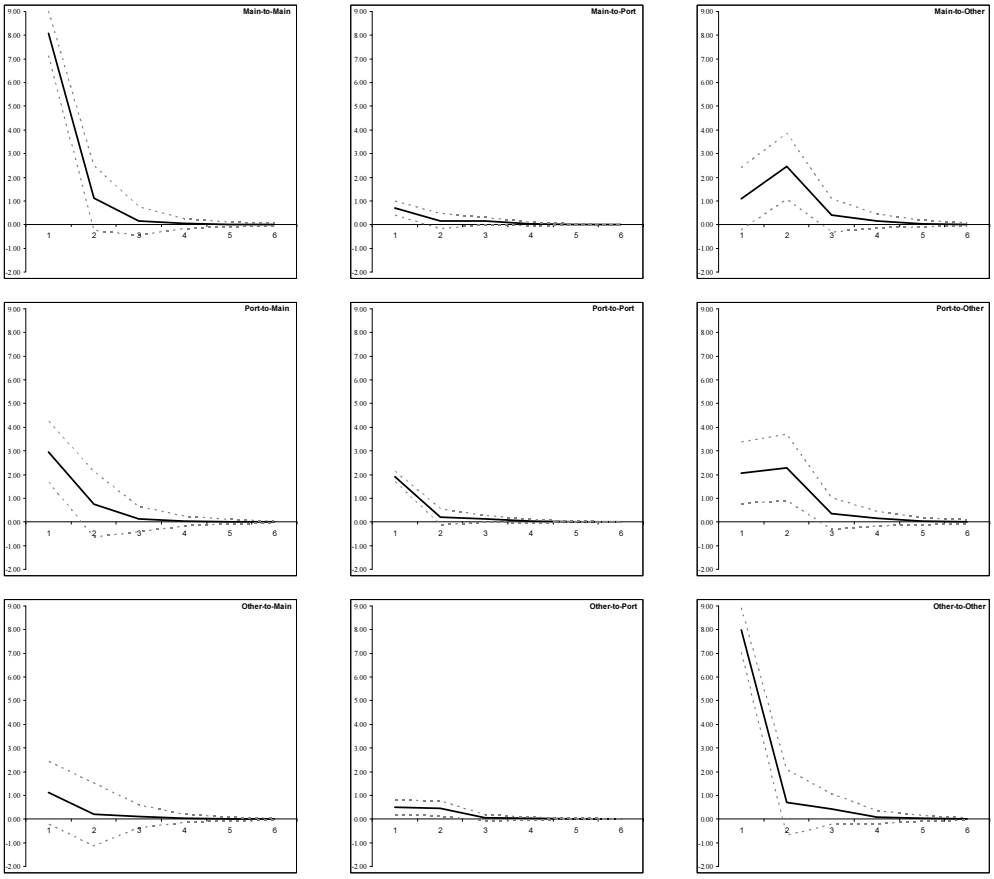
highly-related industries.

The relationship described above for the Main vs. Port relationship is very much different from the Main vs. Other and Port vs. Other relationships. Specifically for the Main vs. Other relationship, we see that an increase in Main absolute discretionary accruals leads to a one time, next quarter shock in the Other industry index. Theses less-related spillover relationships are much weaker than either the own-to-own relationships on the on-diagonal plots or the Main vs. Port relationships. For the Port vs. Other relationship, we see no accruals spillovers from the Other index to the Port index while spillovers from the Port index are small and occur with extended lag.

The off-diagonal GIRF results in Figure 2 thus provide evidence that cross-industry discretionary accruals spillovers occur even after own-persistency effects are accounted for. More importantly, these results provide initial evidence that more-related industries (i.e. Main vs. Port; petroleum producers vs. petroleum-related service providers) interact more strongly and quickly than less related industries (e.g. Other vs. Port; vehicle-related producers vs. petroleum-related service providers). Additionally, the fact that the Port-to-Other relationship occurs with a one quarter lag, one quarter positive impulse, and then no subsequent impact, indicates that cross-industry spillovers may take time for less-related, but still relevant, industries to incorporate the earnings management information.

We now examine Figure 3 which takes into account absolute total accruals. Here, we find a similar pattern as in Figure 2: short-own persistency, smaller related-industry spillovers, and weak to non-existent less-related industry spillovers. Again, this provides evidence that own-earnings management tends to be persistent for a short period of time, that cross-industry earnings management can "spillover" from one related industry to the next, but that un-related industries exhibit little to no earnings management spillovers. Any spillovers from unrelated industries, when statistically significant, tend to be economically small and, for certain

Figure 3. General Impulse Response Function Plots: Absolute Total Accruals



relationships, exhibit information cascading behavior wherein one industry "learns" or reacts to other industries with lag.

V. Discussion

While our finding of significant, but short-lived own-to-own earnings management persistency is important from both a methodological and policy standpoint, our finding of cross-industry earning management spillovers is much more significant. Specifically, most of the prior earnings management literature assumes, through unintentional omission, that earnings management decisions are isolated at the firm and industry level. This literature does not address when one industry's earnings management behavior impacts the earnings management behavior of other, related industries. Yet, we find consistent evidence that accrual decisions *do* spillover among related industries and permanently impact the influenced industry's financial statements. This, in turn, implies that industries take cues from other industries regarding their earnings management behavior thus supporting the hypothesis of earnings management herding.

Yet, the question remains as to why one industry may be influenced by the earnings management practices of a similar industry. While the scope of the paper is more focused on uncovering earnings management herding using a superior and econometrically-sound methodology, we can provide guidance as to why such herding exists.

Explanatory possibilities include the fact that industry group members manage earnings to reach a level of competitive parity with their peers. For example, suppose a given industry is using, as a whole, earnings management to achieve some value-maximizing strategy (firm, managerial, or otherwise) while another, related industry does not. In this case it may be possible for the managing firm to achieve a competitive advantage over the non-managing firm. It's even possible that the previously-non-managing firm would normally have no need or intention to manage its earnings. However, to keep up with other firms, it is effectively forced to manage its earnings just to stay competitive. Thus, the previously-non-managing firm has an incentive to monitor the earnings management behavior of similar, possibly rival firms and to react to this behavior in a similar manner.

While only conjecture, it's possible that the previously-non-managing firm was simply looking for an opportunity to manage its earnings, but did not want to become an industry outlier. With other, like firms managing their earnings, this firm would now be in a position to do so without seeming "out of line". Thus, it's possible that the accrual patterns of surrounding industries are used as a form of accounting "camouflage" by opportunistic managers. Here, firm- or personal-wealth-maximizing managers may use trends in accrual usage within the general industry to hide their own manipulative activity.

An important issue throughout this entire paper is the possibility of an "empirical tautology" whereby our discovery of cross-industry earnings management spillovers are mechanical in nature. Specifically, at first glance, one might be concerned that common industries would use common accounting practices and that our paper is merely uncovering the existence of these common accounting practices, not managerial behavior being driven by information spillovers. Yet, while common financial statement practices by common-industry firms may indeed lead to common earnings management behavior on a contemporaneous basis, this is still a byproduct of agent behavior, not empirical machinations. Additionally, while common accounting practices would likely lead to a high level of accruals comovement, common accounting practices should not cause lead-lag behavior whereby one industry exhibits (different) behavior in one period (relative to another industry) and another industry follows suit.

Thus, common industry behavior should lead to high *contemporaneous* behavior for all fairly-related industries, strong *lead-lag* behavior for similarly-related industries, and weak-to-non-existent *lead-lag* behavior in less-related industries. Consistent with this notion, we find that comovement is strong for highly-related industries and less strong for less-related industries. Further, while strongly-related industries exhibit a significant level of lead-lag behavior, less-related industries exhibit weak-to-little lead-lag behavior. Therefore, common industry-related accounting practices are not likely causing our results, economically or mechanistically.

An additional concern may lie in our use of quarterly data, as opposed to the more standard annual data. This concern is especially present given that quarterly financial statements are often (but not always) unaudited whereas annual financial statements are audited. Yet, we continued with the unaudited quarterly data for four reasons. First, while the use of unaudited financial statements naturally gives us pause, prior literature has used them and their results accepted into the literature. Further, while unaudited and possibly open to greater manipulation, these statements are not likely to be wildly different from annual financial statements. Granted, as Jeter and Shivakumar (1999) note, managers are more likely to manipulate earnings without the fear of detection on a quarterly, as opposed to annual basis.

Yet, if they did so in a way wildly different from the annual statements, financial markets would eventually punish such behavior (not to mention the unwanted attention of regulatory agencies).

Second, while one may be concerned with seasonal issues on an individual firm-by-firm basis, our use of accrual indexes cause firm-specific, idiosyncratic manipulation effects to be dampened. Thus, only a systematic earnings management component remains implying that our results are not being driven by firm-level manipulation. Even in the case where there were significant, systematic, industry-wide manipulation effects, we would detect such effects by finding mean-reversion in our accruals indexes. Yet, we find no such reversion effects. Further, we include a quarterly indicator variable in all VAR-X specifications freeing our results from earnings management seasonality. Thus, while it's possible for some managers to manipulate earnings on a consistent, firm-by-firm basis, we control for this effect, do not find it either in a conditional or unconditional empirical setting, and argue that the hoards of investors and regulators would eventually prevent such abuse.

Third, data granularity issues can erroneously indicate the absence of behavior. For example, if managers are more likely to manage earnings on a quarterly basis, as noted by Jeter and Shivakumar (1999), then using annual data would actually tend to bias the results towards not finding earnings management spillovers. Further, using an annual dataset that glosses over the quarter-by-quarter behavior and finding nothing does not prove the absence of that behavior. Thus, we use quarterly data for the very reason that we may not be able to detect earnings management herding at lower-frequencies. Fourth, and finally, our analysis is based on time series econometric models chosen for their methodological superiority in finding lead-lag relationships, relative to contemporaneous, cross-section models. These models necessarily require longer datasets which is precisely why we choose quarterly data. Running the same models on annual data with substantially fewer data points would, again, run the risk of finding results erroneously counter to our quarterly-based results.

A final area of discussion for earnings management spillovers deals with policy implications in terms of capital markets, firm boards, managerial compensation, and future research. With respect to capital markets, earnings management herding may represent a previously-ignored source of fundamental information that is not fully incorporated into asset prices. For example, investors using fundamental analysis will typically examine firm's financial statements for valuation clues. Yet, if some of those financial statement items are being driven by extra-industry forces, investors have incentives for use such information in their analysis. Additionally, cross-industry information may represent a source of abnormal returns given that this information impacts firms, but may not be easily incorporated into those firms' market prices.

With respect to firms' governing boards, the general topic of governance issues take on new light when a firm's actions are no longer truly their own. Thus, disentangling the incremental effects of a firm's board on the quality of the firm, its financial statements, etc. is complicated by the fact that external forces from similar industries are influencing that firm's decisions. This is especially the case when one considers the role of the board in disciplining and compensating a firm's executive management team.

Finally, our findings of own- and cross- accrual time effects hold implications for previous and future literature alike. Specifically, the majority of prior literature which uses accrual measures as a proxy for earnings management do not filter these measures for either own-persistency or cross-impact effects. Those that attempt to hold industry effects constant use fixed, industry indicator variables which control for industry membership but not within-industry interactions. This study suggests filtering accrual measures prior to their use in subsequent modeling efforts. Pre-analysis accrual filtering will likely increase the accuracy of empirical results by filtering out temporally and cross-industry induced noise. This noise filtering process is especially important in cross sectional designs and panel data approaches which do not explicitly take into account industry interactions. Further, the previous literature occasionally finds contradictory evidence to other, same-topic articles. These contradictions are usually associated with different sample time frames and industry composition. Controlling for temporal and cross-industry accrual effects may reduce or even eliminate contradictory findings in the previous literature.

VI. Conclusion

We examine earnings management behavior within the oil and gas industry. This study finds evidence that (absolute) accrual-based earnings management measures are persistent and not instantly-reverting. Further, we find evidence of cross-industry earnings management influence. This influence takes place on a lead-lag basis which suggests that earnings management information can cascade from one related industry to another.

This study concludes that earnings management herding takes place whereby earnings management in one

sub-industry provides an informative signal to other sub-industries. Managers in these other sub-industries then use this signal as a basis of their own earnings management decisions. Further, while earnings management information can "spillover" between two, less-related industries, the spillover effects are of lower magnitude and of higher duration than the more-related spillover effects. This last point suggests that cross-industry earnings management information is more difficult for firms to incorporate into their own practices when firms are less related. Finally, our results are robust to seasonal effects in earnings management, common industry practices, and present a new frontier for future research in the academic accounting literature.

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