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Limited Attention Bias in Intra-industry Information Transfers: Evidence from Multi-Industry Segment News

DISSERTATION

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for the degree of

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in Management

by

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2017

DEDICATION

To

my husband and parents

in recognition of their care and love

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ABSTRACT OF THE DISSERTATION

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This paper investigates whether investors are attentive to peer firms' segment disclosures. Prior evidence shows that investors react positively to earnings news announced earlier by other firms in the same industry ("peer firms"). The price reaction indicates spillover based on shared industry fundamentals. In this study, I examine whether investors notice that many peers are multi-industry firms and operate in minor industries unrelated to the business of their own firms. Although peer firms' segment disclosures reveal industry-specific earnings, evidence suggests that investors react positively to uninformative earnings news from peer firms' minor segments. When investors' own firms later announce earnings, there is a predictable price reversal associated with peer firms' minor-industry news. Furthermore, the positive price reaction to irrelevant minor-industry news and the later price reversal are concentrated in investors with low sophistication. Taken together, my findings are consistent with the average investor paying limited attention to peer firms' segment disclosures and overreacting to irrelevant news from multi-industry peers.

CHAPTER 1: INTRODUCTION

A firm's earnings news is value-relevant to other firms in the same industry ("peer firms"). Specifically, earnings on average comove within an industry because firms in the same industry are subject to common shocks in industry fundamentals (Freeman and Tse 1992; Ramnath 2002). The information transfer literature has documented stock return co-movement around peer firms' earlier announcements of earnings (Firth 1976; Foster 1981; Han and Wild 1990). This return comovement suggests that investors of yet-to-announce firms update earnings expectations based on earnings news of earlier-announcing peers.

However, the literature has scarcely considered the diversification of earlier-announcing peers. In fact, many firms that announce earnings early in their primary industry operate in additional industries unrelated to the business of other firms in the primary industry. Consequently, for firms in the primary industry, the value-relevance of multi-industry peers' earnings news is confounded by peers' non-primary-industry operations. In this paper, I explore the impact of multi-industry firms in information transfers. In particular, since segment disclosures reveal industry-specific performance, I examine whether investors efficiently use peer firms' segment disclosures to achieve accurate information transfers.

To illustrate concretely the setting of my research questions, consider the following example. Anheuser-Busch is a leading American brewery and operates primarily in beverage and tobacco manufacturing (NAICS code 312). Yet few people may know that Anheuser-Busch also operates in two other industries ("minor industry")—entertainment (NAICS code 713) and fabricated metal products (NAICS code 332). On October 26th 2005, Anheuser-Busch announced 2005Q3 earnings, which was the first in the beverage industry. According to the segment disclosures in Anheuser-Busch's earnings press release, its primary industry contributed

80.2% of 2005Q3 total sales, while the two minor industries contributed 19.8%.[1] Seven days later, Boston Beer Company, the second largest U.S. craft brewery, announced same-quarter earnings. Boston Beer Company operates solely in the beverage industry—Anheuser-Busch's primary industry.

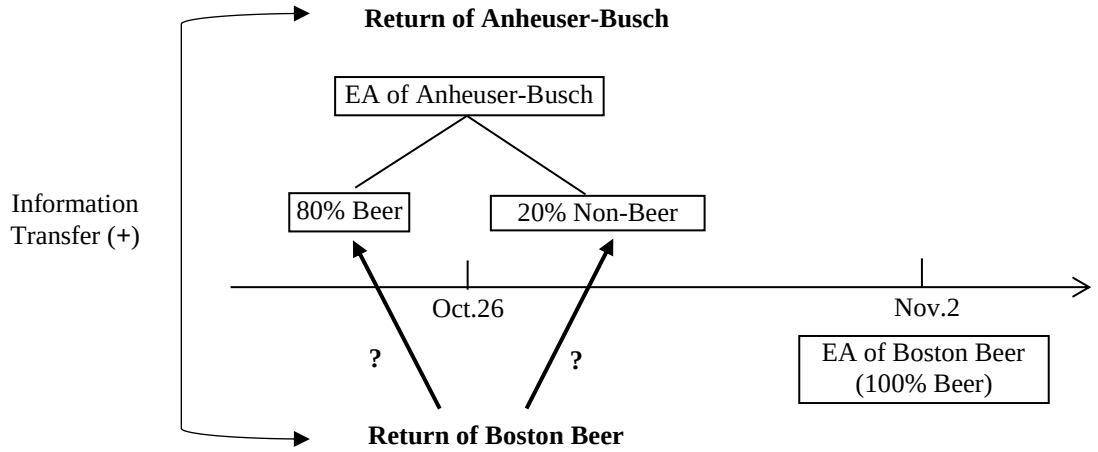

Figure 1: An Illustration of Information Transfers around Multi-industry Firms' Earnings Announcements (EA)

In this setting, I examine three specific questions. First, are earnings from the minor-industry segments of Anheuser-Busch ("multi-industry earlier announcer") informative about earnings of Boston Beer Company ("primary-industry later announcer")? Second, how do investors of Boston Beer Company react to earnings news from the minor-industry segments around Anheuser-Busch's earnings announcement? Third, if investors' response differs from the underlying informativeness of minor-industry earnings, is there predictable correction in stock price when Boston Beer Company announces earnings afterward?

These questions are important due to the prevalence of multi-industry firms like Anheuser-Busch as a source of information transfers. If we define the first three announcers of quarterly earnings in each industry as "early announcers," multi-industry firms account for 51.7%

[1] The full text of Anheuser-Busch's 2005Q3 earnings press release is accessible at https://www.sec.gov/Archives/edgar/data/310569/000106880005000643/ex99p1.txt.

of the total market value of early announcers. In addition, 83.9% of pure-industry firms have at least one multi-industry peer announcing earnings before them.[2] Thus, understanding the accuracy of information transfers from multi-industry firms is of interest to investors.

I formally derive predictions using a simple adaptation of the limited attention model of Hirshleifer and Teoh (2003). Limited attention is a cognitive constraint that prevents individuals from attending to all available information (Kahneman 1973). Hirshleifer and Teoh (2003) analytically show that investors with limited attention neglect earnings components, which leads to overreaction to the component with lower informativeness. In this study, I apply the limited attention theory in the information transfer process. Specifically, I posit that at least some investors are inattentive to peer firms' segment disclosures and neglect the different industry components of peer firms' earnings. As a result, they overreact to peer firms' minor-industry news in their price response to peer firms' earlier earnings announcements. When investors' own firms announce earnings later, the previous overreaction is corrected, which leads to a predictable reversal in stock returns. My model shows that a low degree of relatedness between earlier announcers' primary and minor industries is a necessary condition for overreaction. Furthermore, my model predicts that the overreaction is concentrated in later announcers with lower investor sophistication.

I test these predictions in a sample of quarterly earnings announcements from 1998 to 2013. I focus on earlier announcers that operate in multiple industries—a primary industry and other minor industries, and later announcers that operate solely in the primary industry.[3] Earlier announcers' industry-specific earnings news is calculated from their segment disclosures.

[2] The statistics are based on a sample of quarterly earnings announcements from 1998 to 2013. Details of the distribution of multi-industry firms are presented in Table 2 and Table 3.

[3] This paper focuses on later announcers that only operate in one industry—the earlier announcer's primary industry. Predictions for multi-industry later announcers are harder to derive. Moreover, pure-industry firms account for the majority (80.1%) of non-early announcers (untabulated).

Following the finance literature, I employ commodity flow data and construct two measures of the degree of relatedness between earlier announcers' primary and minor industries.[4]

For the first research question, I find that the informativeness of earlier announcers' minor-industry earnings news increases in the interindustry relatedness between primary and minor industries. More specifically, the association between earlier announcers' minor-industry earnings news and later announcers' earnings news is negative and insignificant when interindustry relatedness is low. This association becomes positive and statistically significant when interindustry relatedness is high. These findings confirm that segment disclosures allow distinction of the less-relevant component of peer firms' earnings news.

However, investors of later announcers react as if they fail to distinguish between earlier announcers' primary- and minor-industry components of earnings. For the second research question, an efficient information transfer would predict that investors' response to minor-industry earnings news increases in the degree of interindustry relatedness. But the empirical evidence is not consistent with this prediction. Instead, I find that later announcers' stock returns around multi-industry peers' earnings releases are positively associated with peers' minor-industry earnings news when interindustry relatedness is low. Further cross-sectional analysis reveals that the positive price reaction to not-highly-related minor-industry news is concentrated in later announcers with low institutional ownership, a proxy for low investor sophistication. The evidence is consistent with overreaction by investors, especially less-sophisticated ones, to peer firms' irrelevant minor-industry earnings news during information transfers.

[4] The two measures are *Vertical Relatedness* and *Complementarity*. *Vertical Relatedness* captures the degree of input transfers between two industries, namely the integration along the supply chain. *Complementarity* captures the overlap between two industries in their input and output markets. See Chapter 3.3 for details of the construction of relatedness measures.

The initial overreaction should be corrected when later announcers release their actual earnings, which leads to the tests of my third research question. At later announcers' own earnings releases, I find predictable abnormal returns that are negatively associated with earlier announcers' minor-industry earnings news. The magnitude of correction is economically significant. A hedge portfolio based on minor-industry news yields a two-day market excess return of 0.266%, which translates to 33.53% on an annualized basis. Again, the predictable return correction is concentrated in later announcers with low institutional ownership. These findings are consistent with predictions from my limited attention model. Taken together, my evidence indicates that segment disclosures can facilitate accurate information transfers but the average investor pays limited attention to peer firms' industry segment news.

My study contributes to the segment reporting literature by first documenting the potential usefulness of segment disclosures for peer firms' valuation. Despite that multi-industry firms significantly influence intra-industry information transfers, evidence on the potential externality of segment disclosures is scant. Studies to date focus on the impact of segment disclosures on the disclosing firm.[5] This focus underestimates the capital market benefits of segment disclosures. In this paper, I consider the influence of segment disclosures on peer firms' valuation via information transfers. My evidence suggests that investors, at least those with enough sophistication, can learn from peer firms' segment disclosures and avoid overreaction to less-relevant news from unrelated businesses. Thus, standard setters will find my evidence pertinent in deciding future segment reporting requirements.[6]

[5] Early studies show that segment disclosures enhance the valuation accuracy of the disclosing firm (see, e.g., Kinney 1971; Collins 1975). Current debates on segment reporting concern the tradeoff between the disclosing firm's proprietary costs and its agency issues (Berger and Hann 2003; Botosan and Stanford 2005; Bens, Berger, and Monahan 2011).

[6] In a recent survey by the Financial Accounting Standards Advisory Council (FASAC) on what issues should be tackled by the Financial Accounting Standards Board (FASB) in 2016 and beyond, investors rank segment reporting as the top priority (Golden 2016).

This paper also adds to a growing stream of research on information transfers from peer firms' news.[7] In particular, I identify that multi-industry firms confound the transfer of earnings news across firms in the same industry. My study is most related to Cen, Chan, Dasgupta, and Gao (2013), which examines how multi-industry firms confound the diffusion of information from large to small firms. In addition to corroborating their findings in a different setting, I extend Cen et al. (2013) in two key aspects. First, Cen et al. test diffusion from news embedded in multi-industry firms' weekly stock returns, to which the contributions from individual industry segments are largely unknown. In contrast, I examine spillovers from multi-industry firms' announcements of earnings, to which the contribution from each industry can be inferred from segment disclosures. The earnings announcement setting allows me to directly test the potential usefulness of segment disclosures and investors' use of segment information. Second, beyond documenting a problematic initial response as in Cen et al., I provide evidence on the fundamental informativeness of earnings and find predictable price correction when later announcers release actual earnings. My evidence helps rule out the alternative explanations faced by Cen et al. and lends strong support to investor inattention to peer firms' diversification.

Furthermore, I show that the limited attention bias explains the return reversal documented by Thomas and Zhang (2008). Thomas and Zhang find a negative correlation in later announcers' stock returns between two points in time: one at earlier earnings announcements of peer firms, the other at later announcers' own earnings releases. The later reversal suggests that investors of later announcers have overreacted to peer firms' earlier

[7] See, for example, Ramnath (2002), Thomas and Zhang (2008), Kim, Lacina and Park (2008), Gleason, Jenkins and Johnson (2008), Durnev and Mangen (2009), Hilary and Shen (2013), and Wang (2014).

earnings releases. Yet, the reason of this overreaction is not clear.[8] The authors hence call for further research on this topic.

Employing a limited attention model, I demonstrate that investors' neglect of peer firms' earnings components leads to a return reversal. Empirically, I find that the return reversal documented by Thomas and Zhang (2008) is only present when earlier announcers include multi-industry firms. When all earlier announcers are pure-industry firms, there is no significant return reversal. Consistent with predictions from my analytical model, the return reversal is stronger when the proportion of minor-industry sales is greater or when the relatedness between primary and minor industries is lower. These findings indicate that the overreaction documented by Thomas and Zhang is driven by investor inattention to peer firms' irrelevant business operations.

More importantly, my study offers a parsimonious explanation to both the overreaction documented by Thomas and Zhang (2008) and the underreaction documented by Ramnath (2002). Ramnath also examines intra-industry information transfers around earnings announcements. However, his evidence suggests that investors of later announcers have *underreacted* to the implications from earlier announcers' earnings news. Due to Ramnath's sample selection and research design, primary-industry earnings news likely dominates the measure of earnings news in his tests.[9] Therefore, I postulate that the heterogeneity between

[8] Thomas and Zhang propose that the overreaction is driven by investors' failure to adjust for the repeat of the same industry component in earnings news disclosed by multiple earlier announcers. However, they find evidence of overreaction even in the response to the first announcer in the industry. Hence, the authors acknowledge that their explanation is not adequate.

[9] First, Ramnath defines industries by analyst following: firms with at least five analysts in common are classified into the same industry group. Those firms are more likely to share homogenous industry components. Second, the earnings news signal used by Ramnath is the predicted earnings news for each later announcer, which is estimated from the relations in past earnings news between the early announcer and each later announcer. If the later announcer only operates in the primary industry, the predicted earnings news will only incorporate the early announcer's primary-industry earnings news.

different industry components of earnings explains the discrepancy between Thomas and Zhang (2008) and Ramnath (2002).

To test my conjecture, I take a close look at the information transfer process by disaggregating earlier announcers' earnings news into the primary- and minor-industry components. I analytically show that investors who neglect peer firms' earnings components exhibit both overreaction to the minor-industry component and underreaction to the primary-industry component.[10] The empirical findings are consistent with these predictions.[11] Thus, my study reconciles the overreaction documented by Thomas and Zhang (2008) with the underreaction documented by Ramnath (2002) in a limited attention framework.

The rest of the paper proceeds as follows. Chapter 2 develops testable hypotheses and discusses the research design. Chapter 3 describes the construction of the sample and measurement of key variables. In Chapter 4, empirical results are presented. Chapter 5 concludes the paper.

CHAPTER 2: HYPOTHESIS DEVELOPMENT AND TEST DESIGN

2.1 The Informativeness of Minor-industry Earnings News in Information Transfers

Research on information transfers finds that earnings announced by one firm can help forecast earnings of yet-to-announce firms in the same industry (Freeman and Tse 1992; Ramnath 2002). Earnings on average co-move within an industry, because firms in the same industry share common industry fundamentals. However, if an early announcer operates in multiple industries, earnings news from its minor industries may not be informative of a later announcer's earnings.

[10] See Chapter 2.3 for details of the model.
[11] See Column 4 of Table 6 Panel A.

The degree to which minor-industry earnings news informs a primary-industry later announcer's earnings will depend on how closely the primary and minor industries are related. Firms diversify for different reasons: to reap synergies in distribution channels, to control input prices, or to hedge against risks in the current product market. The informativeness of minor-industry news should therefore be higher for minor industries that are highly related to the primary industry. I propose the following hypothesis (in alternative form) to test the variation in informativeness:

H1: The association between multi-industry firms' minor-industry earnings news and the earnings news of pure-industry peers in the primary industry increases in the relatedness between the primary industry and minor industries.

To test H1, I estimate the following equation in a sample of multi-industry early announcers matched to multiple pure-industry later announcers:

$$\begin{aligned} UE_{j,t} = \alpha_0 + \alpha_1 EARLYUE\_PRIMARY_{i,t} + \alpha_2 EARLYUE\_MINOR_{i,t} \\ + \alpha_3 Z_{i,t} + \alpha_4 Z_{i,t} \times EARLYUE\_MINOR_{i,t} + Controls + \varepsilon_{i,j,t}. \end{aligned} \quad (1)$$

$EARLYUE\_PRIMARY_{i,t}$ ($EARLYUE\_MINOR_{i,t}$) is the earnings news from multi-industry early announcers' primary industry (minor industries). $UE_{j,t}$ is the same-quarter earnings news of yet-to-announce pure-industry firms in the primary industry.[12] Later announcers' earnings news in the prior quarter ($UE_{j,t-1}$) and in the same fiscal quarter last year ($UE_{j,t-4}$) are included as control variables. This allows assessing the incremental informativeness of peer firms' earnings news beyond any predictability derived from serial correlations in seasonally-differenced earnings (Foster 1977; Bernard and Thomas 1990). Z is a measure of interindustry relatedness between the primary and minor industries.[13] H1 predicts a positive coefficient on the interaction

[12] Subscript *i* indicates a multi-industry early announcer and subscript *j* indicates a later announcer in the primary industry, unless otherwise stated.
[13] See Chapter 3.3 for details of the relatedness measures.

term between Z and *EARLYUE_MINOR* ($\alpha_4 > 0$).

2.2 Later Announcers' Returns around Multi-industry Peers' Earnings Announcements

Under the efficient market hypothesis, if the primary- and minor-industry components of early announcers' earnings news differ in implications for later announcers, investors of later announcers should react differently to the two components, as long as early announcers' segment information is publicly available.[14] Specifically, they should react to minor-industry earnings news only when the minor industry is related to the primary industry, and not react when minor-industry news is not relevant to the primary industry. Therefore, the efficient market hypothesis would predict later announcers' price reactions around multi-industry firms' earnings releases as follows:

H2: The association between later announcers' stock returns around multi-industry firms' earnings announcements and multi-industry firms' minor-industry earnings news increases in the relatedness between the primary industry and minor industries.

To test H2, I estimate the following equation:

$$\begin{aligned} RESP_{i,t} = {} & \alpha_0 + \alpha_1 EARLYUE\_PRIMARY_{i,t} + \alpha_2 EARLYUE\_MINOR_{i,t} \\ & + \alpha_3 Z_{i,t} + \alpha_4 Z_{i,t} \times EARLYUE\_MINOR_{i,t} + Controls + \varepsilon_{i,t}. \end{aligned} \tag{2}$$

RESP is the average of all later announcers' market-adjusted cumulative abnormal returns during days [0, +2] around a multi-industry firm's earnings announcement. I use the average, instead of each later announcer's individual response, because information transfers could be negative due to the direct competition between two firms (Kim, Lacina, and Park 2008; Koo, Wu, and Yeung 2014). Averaging across all later announcers removes noises from negative

[14] I searched and read each multi-industry early announcer's earnings press releases. 90% of them disclosed segment information at earnings announcements. Results for H1 and H2 are qualitatively similar when the sample is restricted to firm-quarters with segment disclosures at earnings announcements.

transfers and leaves a better measure of positive transfers about industry commonalities.[15] The return window includes day +2 to allow for one-day delay in investor response to peer firms' earnings announcements. The key explanatory variables are the same as in H1. $EARLYUE\_PRIMARY_i$ ($EARLYUE\_MINOR_i$) is the earnings news from early announcers' primary industry (minor industries). The control variables include later announcers' average market capitalization ($SIZE_i$), average book-to-market ratios (BM_i), and average abnormal returns over days [-63, -2] before an early announcer's earnings release ($PRET_i$). *Z* is a measure of interindustry relatedness between the primary and minor industries. Under the efficient market hypothesis, H2 predicts a positive coefficient on the interaction term between Z and *EARLYUE_MINOR* ($\alpha_4 > 0$).

2.3 Later Announcers' Stock Returns around their Own Earnings Announcements

If investors of later announcers respond correctly to multi-industry peers' earnings releases, their reactions around later announcers' own earnings releases should be unrelated to the previously-announced earnings or their previous price response. However, it is probable that investors react in an inefficient manner given the abundant evidence of inefficient response to their own firms' earnings and earnings components. In particular, the post-earnings announcements drifts indicate underreaction to aggregate earnings news (e.g., Foster, Olsen, and Shevlin 1984; Bernard and Thomas 1989). Moreover, consistent with failure to understand implications of different components of earnings, investors overreact to the accrual component that has lower persistence than the cash flow component (e.g., Sloan 1996). It is puzzling to observe overreaction to a component of earnings in light of the underreaction to aggregate

[15] I did not partition the sample by the type of transfers because identifying competitive relationships involves extensive work. Kim et al. (2008) document negative information transfers from management earnings forecasts to rival firms, which are identified from Hoover's or the forecasting firm's 10-K reports. Koo et al. (2014) identify competitive moves based on textual analysis of management attribution in earnings forecasts.

earnings.

In the information transfer literature, a similar puzzle exists (Figure 2). Ramnath (2002) finds that early announcers' aggregate earnings news (UE_{EARLY}) is positively associated with later announcers' earnings announcement returns ($CAREAD_{LATER}$), implying that investors of later announcers have underreacted to early announcers' earnings news. However, Thomas and Zhang (2008) document a negative correlation between later announcers' price response to peer firms' earlier earnings releases ($RESP_{LATER}$) and later announcers' price response to their own earnings releases ($CAREAD_{LATER}$), suggesting that investors of later announcers has overreacted in their response to peer firms' earnings news.

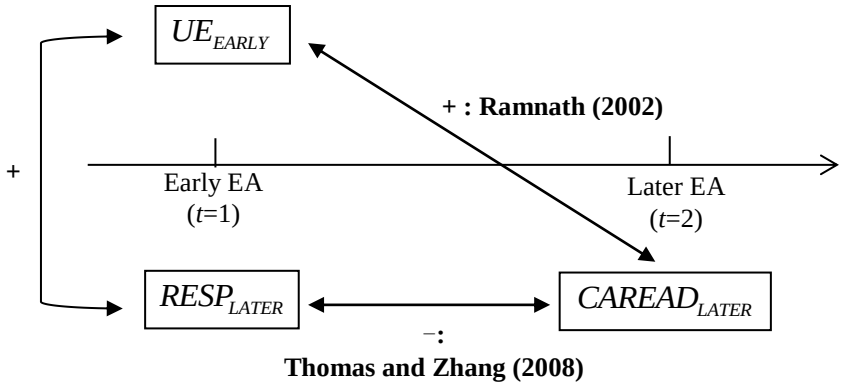

Figure 2: An Illustration of the Findings in Ramnath (2002) and Thomas and Zhang (2008)

Hirshleifer and Teoh (2003) and Hirshleifer, Lim and Teoh (2011) offer a limited attention framework that reconciles underreaction to earnings with overreaction to accruals. Limited attention is a necessary consequence when individuals with finite cognitive resources face the vast amount of information in the environment. Attention thus becomes selective, and investors differ in the amount and type of signals they are able to digest. Hirshleifer and Teoh (2003) and Hirshleifer, Lim and Teoh (2011) show that investors' divergent neglect of different subsets of signals can explain several puzzling stylized facts. Borrowing their model setup, next I demonstrate how limited attention bias can also explain the over- and under-reaction in

information transfers when multi-industry firms contaminate the transfer process.

Assume that there are two risky assets—the stocks of an early announcer and a later announcer—and cash in the economy. The early announcer mainly operates in industry *P* (primary) but also operates in industry *M* (minor). For simplicity, assumes that the early announcer invests ½ of its assets in industry *P* and ½ in industry *M*. The later announcer has the same industry-P operations as the early announcer but invest all of its assets in industry *P*. Further assume that the later announcer's unconditional price at date 1 is $E[S_1] = 0$.

At date 1, the early announcer announces earnings $e = p + m$, where *p* is the earnings from industry *P* and *m* is the earnings from industry *M*. *e* is an unbiased estimate of the early announcer's liquidation value at date 2. The correlation between *p* and *m* is $\omega = corr(p, m)$, $\omega \in [-1, +1]$.

At date 2, both the early announcer and later announcer liquidate. Since the early and later announcers have exactly the same industry-P business, the later announcer's liquidation value at date 2 equals *p*.

The later announcer has risk-averse investors, who are identical except for differences in how much public information they attend to. The amount of information an investor can process depends on the cost of obtaining such information. Assume that fraction f^i is inattentive to the early announcer's earnings news, fraction f^e attends to the early announcer' earnings news but does not distinguish between *p* and *m*, and the rest fraction $1 - f^i - f^e$ is attentive to both the early earnings news and the two earnings components.

An important conclusion from Hirshleifer and Teoh (2003) is that when the market has no private information, the equilibrium stock price at date 1 equals a weighted average of the beliefs of the three investor groups conditional on information available at date 1. Inattentive

investors affect price because completely arbitraging away the mispricing is too risky for fully attentive investors. Furthermore, under Verrecchia's (2001) heuristic trading approach that trader biases only manifest in first moments, the weight of each investor group simplifies to the group's fraction.

At date 1, after observing the early announcer's earnings news, investors of the late announcer update earnings expectation, which leads to price movement:

$$\begin{aligned} RESP_{LATER} &= S_1 - E[S_1] = S_1 \\ &= f^i E[S_2] + f^e E[S_2 \mid e] + (1 - f^i - f^e) E[S_2 \mid e, p, m] \\ &= 0 + f^e \frac{(p+m)}{2} + (1 - f^i - f^e) p \\ &= (1 - f^i - \frac{f^e}{2}) p + \frac{f^e}{2} m \end{aligned} \tag{a}$$

Note S_1 is a weighted average of the beliefs of the three types of investors. f^i investors do not update; f^e investors wrongly assume that all the earnings come from industry *P* and their expected rate of return from industry *P* equals the simple average of *p* and *m*; $1 - f^i - f^e$ investors correctly update.

At date 2, the true liquidation value of the later announcer reveals: $S_2 = p$. The price movement of the later announcer at date 2, denoted as $CAREAD_{LATER}$, equals $S_2 - S_1$:

$$\begin{aligned} CAREAD_{LATER} &= S_2 - S_1 \\ &= p - (1 - f^i - \frac{f^e}{2}) p - \frac{f^e}{2} m \\ &= (f^i + \frac{f^e}{2}) p - \frac{f^e}{2} m \end{aligned} \tag{b}$$

Therefore, the correlations between $CAREAD_{LATER}$ and the early announcer's industry segment earnings news are:

$$corr(CAREAD_{LATER}, p) = f^i + \frac{f^e}{2}(1-\omega);$$
$$corr(CAREAD_{LATER}, m) = (f^i + \frac{f^e}{2})\omega - \frac{f^e}{2} \quad \text{(c)}$$

This proves:

$$corr(CAREAD_{LATER}, p) > 0 \text{ (underreaction to } p\text{) for all } \omega;$$
$$corr(CAREAD_{LATER}, m) < 0 \text{ (overreaction to } m\text{) when } \omega < \frac{f^e}{2f^i + f^e}. \quad \text{(d)}$$

That is, when $\omega < \frac{f^e}{2f^i + f^e}$, we observe both underreaction to the early announcer's primary-industry news and overreaction to minor-industry news. Part (d) confirms that over- and under-reaction in information transfers can coexist owing to a single psychological constraint—limited attention.

Since the extent of overreaction is contained in the later announcer's price movement at date 1, Thomas and Zhang examine the correlation between $RESP_{LATER}$ and $CAREAD_{LATER}$, which equals:

$$\begin{aligned} corr(RESP_{LATER}, CAREAD_{LATER}) &= corr((1-f^i-\frac{f^e}{2})p + \frac{f^e}{2}m, (f^i+\frac{f^e}{2})p - \frac{f^e}{2}m) \\ &= (1-f^i)f^i + \frac{f^e}{2}(1-2f^i-f^e)(1-\omega) \end{aligned} \quad \text{(e)}$$

It follows that:

$$corr(RESP_{LATER}, CAREAD_{LATER}) < 0$$
$$\text{if } 2f^i + f^e > 1 \text{ and } \omega < 1 - \frac{2(1-f^i)f^i}{(2f^i + f^e - 1)f^e}. \quad \text{(f)}$$

Part (f) shows that investor's failure to distinguish between peer firms' earnings components leads to a negative correlation between $RESP_{LATER}$ and $CAREAD_{LATER}$. Particularly,

when the fraction completely ignoring earnings signal and the fraction only ignoring earnings components are both high ($2f^i + f^e > 1$), the negative correlation concentrates in industry *M* with low ω ($\omega < 1 - \frac{2(1-f^i)f^i}{(2f^i + f^e - 1)f^e}$). In other words, the return reversal around later announcers' earnings releases is stronger when earlier announcers operate to a greater extent in minor industries, and when the minor industries are unrelated to the primary industry (lower ω).

Thus, the above analysis leads to the following three hypotheses (in alternative form) about later announcers' stock returns at date 2:

H3a: Later announcers' stock returns around their own earnings releases are negatively correlated with earlier announcers' minor-industry earnings news.

H3b: The negative correlation between later announcers' earnings announcement returns and their price response to earlier announcers' earnings releases is stronger when earlier announcers involve to a greater extend in minor-industry businesses.

H3c: The negative correlation between later announcers' earnings announcement returns and their price response to earlier announcers' earnings releases is stronger when the relatedness between earlier announcers' primary and minor industries is lower.

To test H3a, I estimate the following equation in a sample of pure-industry later announcers:

$$CAREAD_{j,t} = \alpha_0 + \alpha_1 AVG\_EARLYUE\_PRIMARY_{j,t} + \alpha_2 AVG\_EARLYUE\_MINOR_{j,t} + Controls + \varepsilon_{j,t}. \quad (3)$$

CAREAD is later announcer *j*'s market-adjusted cumulative abnormal returns during the two-day window [0, +1] around *j*'s own earnings announcements. *AVG_EARLYUE_PRIMARY* (*AVG_EARLYUE_MINOR*) is the aggregate unexpected earnings, value weighted by earlier announcers' market values of equity at the end of quarter *t*, from the primary industry (minor

industries) of all earlier announcers. In testing overreaction (H3), to further ensure that the split between primary and minor industries is publicly available at earlier announcers' earnings releases, all segment information is obtained from the annual report of the fiscal year before quarter *t*. H3a predict $\alpha_2 < 0$ in equation (3).

The control variables include later announcers' market capitalization ($SIZE_j$), later announcers' book-to-market ratios (BM_i), and later announcers' abnormal returns over days [-63, -2] before the earnings announcements ($PREADRET_j$). In addition, later announcers' earnings announcement returns in the prior quarter ($CAREAD_{t-1}$) and in the same fiscal quarter last year ($CAREAD_{t-4}$) are included to control for predictable returns due to post-earnings announcement drifts (Bernard and Thomas 1989).

To test *H3b*, I estimate equation (4) in the same sample of pure-industry later announcers:

$$CAREAD_{j,t} = \beta_0 + \beta_1 AVG\_RESP_{j,t} + \beta_2 M_{j,t} + \beta_3 M_{j,t} \times AVG\_RESP_{j,t} + Controls + \varepsilon_{j,t}. \quad (4)$$

AVG_RESP is *j*'s average market-adjusted cumulative abnormal returns during days [0, +2] around all earlier earnings announcements in the primary industry. *M* is a measure of the extent to which earlier announcers operate in non-primary industries. H3b predict $\beta_3 < 0$ in equation (4).

Finally, H3c is tested by the following equation (5):

$$CAREAD_{j,t} = \beta_0 + \beta_1 AVG\_RESP_{j,t} + \beta_2 Z_{j,t} + \beta_3 Z_{j,t} \times AVG\_RESP_{j,t} + Controls + \varepsilon_{j,t}. \quad (5)$$

All variables, except for *Z*, are the same as in equation (4). *Z* is a measure of the relatedness between earlier announcers' primary and minor industries. H3c predicts $\beta_3 > 0$ in equation (5).

2.4 The Impact of Investor Sophistication on Overreaction

While the previous discussion treats investor sophistication (f^i and f^e) as given, in this section I directly test how the intensity of overreaction varies with investor sophistication. It

follows from part (g) that the degree of overreaction increases when the proportion of investors inattentive to earnings components (f^e) is larger.

$$\frac{\partial corr(RESP_{LATER}, m)}{\partial f^e} = \frac{1-\omega}{2} > 0;$$
$$\frac{\partial corr(CAREAD_{LATER}, m)}{\partial f^e} = \frac{\omega-1}{2} < 0;$$
$$\frac{\partial corr(RESP_{LATER}, CAREAD_{LATER})}{\partial f^e} = \frac{1-2f^i-2f^e}{2}(1-\omega) < 0 \quad \text{(g)}$$

when $2f^i + f^e > 1$(a necessary condition of $corr(RESP_{LATER}, CAREAD_{LATER}) < 0$).

When investors are more sophisticated ($f^e \to 0$ and $f^i \to 0$), such as institutional investors who have more resources and expertise to analyze peer firms' segment disclosures, the reversal at later announcers' earnings releases attenuates ($corr(CAREAD_{LATER}, m) \to 0$ and $corr(RESP_{LATER}, CAREAD_{LATER}) \to 0$). Hence, I propose the following hypothesis about the impact of investor sophistication on overreaction:

H4: The overreaction to earlier announcers' minor-industry earnings news is concentrated in later announcers with lower investor sophistication.

Investor sophistication is measured by institutional investor holdings, a proxy that has been widely used in prior literature (e.g., Hand 1990; Walther 1997; Bartov, Radhakrishnan, and Krinsky 2000). The test design involves partitioning the sample by investor sophistication and comparing the estimation results of equation (3) (4) (5) across subsamples.

CHAPTER 3: DATA AND SAMPLE SELECTION

3.1 Sample Selection

The sample includes all NYSE, AMEX, and NASDAQ firms in the quarterly

COMPUSTAT file between 1998 and 2013.[16] The sample period starts in 1998 based on two considerations. First, quarterly segment information needs to be collected from 10-Q filings stored in the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system, which became applicable to all registrants in January 1996. Second, the starting year is further moved forward by two years to ensure that all sample firms are subject to the same segment reporting standard, SFAS 131, which was issued by the FASB in June 1997 and is effective for fiscal years commencing after December 15, 1997. Following Freeman and Tse (1992), I restrict the sample to firms with December fiscal year-ends to align fiscal quarters of which earnings information is transferred. I further require the sample firms to have at least one analyst earnings forecast in I/B/E/S to remove small firms that are not followed by any analysts.

To identify multi-industry firms, I obtain annual information on industrial segments from the *COMPUSTAT Historical Segments* database (segment type BUSSEG or OPSEG). Following the extant segment literature, I remove "contaminated" observations whose sum of segment sales deviate from consolidated sales by more than 5%. Since I focus on industry segments, all corporate, elimination and reconciliation segments are deleted. Segments with non-missing segment sales (*SALES*) and segment operating profit (*OPS*) are then aggregated by industry for each firm-year.[17] Industry is defined by 3-digit North American Industry Classification System (NAICS) codes.[18]

[16] In line with prior studies in information transfers (Foster 1981; Freeman and Tse 1992; Ramnath 2002; Thomas and Zhang 2008), I examine quarterly earnings announcements rather than annual earnings announcements.

[17] There are various measures of segment earnings: operating profit (OPS), operating income before depreciation (OIBDPS), operating income after depreciation (OIADPS), pretax income (PIS), income before extraordinary items (IBS), and net income (NIS). Operating profit (OPS) is the most populated measure. The other measures are relatively sparsely reported. *COMPUSTAT* defines OPS as sales of the segment minus its allocated share of operating costs and expenses, such as, cost of goods sold; selling, general, and administrative expenses, and depreciation, depletion and amortization. This definition is consistent with the requirement under the old reporting standard SFAS 14 and also fits how most firms define segment earnings under SFAS 131, when segment earnings no longer need to conform to GAAP (Berger and Hann 2007).

[18] Although most information transfer and segment disclosure studies employ the Standard Industry Classification (SIC) codes to define industry (e.g., Foster 1981; Freeman and Tse 1992; Berger and Hann 2003; Thomas and

"Multi-Industry firms" are firms with multiple industry segments after the consolidation. The industry that accounts for more than 50% of total sales is the firm's "primary industry." The industry that accounts for less than 50% of total sales is the firm's "minor industry." If a firm has no industry generating more that 50% of its total sales, the firm is removed from the sample. Firms with only one industry segment after the consolidation, together with firms without industry segment disclosures, are classified as "Pure-industry firms." Firms operating primarily in financial industries (NAICS 2-digit = 52 or NAICIS 3-digit = 531) or unclassified industries (NAICS 2-digit = 99) are removed from the sample.

For each industry in each quarter, I identify the first *three* announcers as "early announcers."[19] Freeman and Tse (1992) find information transfer is strongest for the first earnings announcement in the industry, suggesting that the potential for information transfer declines with successive announcements (Givoly and Palmon 1982). However, selecting more firms from each industry-quarter helps diversify firm-specific factors and noises, hence increasing the power of the test. Choosing three as the cutoff is a compromise between the two considerations.

The above steps generate a sample of 3,213 multi-industry early announcers and 53,792 pure-industry firms. For pure-industry firms, I obtain the number of common shares held by 13-f institutions from Thomson-Reuters. For multi-industry early announcers, to get a precise

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Zhang 2008), the failure of the SIC in producing homogeneous industries has often been discussed in the literature (Clarke 1989; Fan and Lang 2000; Krishnan and Press 2003; Bhojraj, Lee, and Oler 2003). In 1998, to address problems of the SIC, governmental statistical agencies in Canada, Mexico, and the United States jointly created a new industry classification system—the NAICS. The NAICS replaces and improves upon the SIC *"by using a production-based framework throughout to eliminate definitional differences; identifying new industries and reorganizing industry groups to better reflect the dynamics of our economy; and allowing first-ever industry comparability across North America (Saunders 1999, p. 37)."* NAICS is also the industry classification employed by the Bureau of Economic Analysis Input-Output Accounts, from which I will construct measures of interindustry relatedness (see Chapter 3.3). The first three digits are chosen to obtain enough number of industry partitions (56 industries).

[19] To test H3 in Table 6, I expand the examination to "*earlier* announcers", which include all primary-industry peers announcing earnings at least three trading days before a pure-industry firm.

measure of quarterly earnings news from minor industries, I hand-collect quarterly segment sales (SALES) and segment operating profit (OPS) from EDGAR 10-Q filings.[20] Fourth-quarters are not collected because segment earnings in the fourth quarter equal the annual number minus the sum of previous three quarters' numbers, which means an extra set of 10-Q filings need to be collected.

I assign NAICS codes to each collected quarterly segment by referring to segments with similar names in adjacent years in the COMPUSTAT annual segment database. Next, quarterly segments are aggregated by 3-digit NAICS codes to get industry-level sales (*SALES_IND*) and operating profits (*OPS_IND*) for each firm-quarter. To ensure that operations in minor industries represent a significant portion of firms' economic activities, I require sales from minor industries collectively account for at least 5% of consolidated sales.

Lastly, multi-industry announcers without any pure-industry peers announcing at least three trading days behind or pure-industry firms without any industry peers announcing earnings at least three trading day in advance are removed from the sample. The three trading day gap restriction is imposed to ensure no overlap between early announcers' and pure-industry firms' earnings announcement windows.

The final sample includes 1,571 multi-industry early announcers and 51,158 pure-industry firms. Table 1 presents details of the sample-selection process. The number of observations in different tests may vary depending on the test designs.

3.2 Measures of Unexpected Segment Earnings

Earnings news from each segment is measured by seasonally-adjusted changes in segment operating profits, scaled by the firm's market value of equity. This measure assumes

[20] Sales to third-party customers (external sales) are collected as *SALES* whenever external sales and intersegment sales are separately disclosed.

that investors use a seasonal random walk model to form expectations of quarterly segment earnings. Firm-level earnings news is measured in a similar way.[21] I do not use analyst forecasts as the proxy of investor expectations because analysts do not provide earnings forecasts for individual segments.

3.3 Measures of Interindustry Relatedness

Relatedness between the primary and minor industries (ω) is a key parameter for my predictions. Following the extant literature (Fan and Lang 2000; Shahrur 2005; Kale and Shahrur 2007), I construct two measures of interindustry relatedness from the benchmark input-output (IO) accounts of the U.S. economy, which record the commodity flows across industries. The Bureau of Economic Analysis (BEA) publishes summary benchmark input-output accounts annually, the *Use* table of which is a matrix containing the dollar amount of industry *a*'s output required to produce industry *b*'s total output, x_{ab}, for each pair of industries *a* and *b*.

The first measure is *Vertical Relatedness*, which represents the degree to which the primary industry employs minor industries' products and services as input (upstream relatedness) or supplies output as minor industries' input (downstream relatedness). Following Fan and Lang (2000), I divide x_{ab} by the dollar amount of industry *b*'s total output to get v_{ab}, namely the dollar value of industry *a*'s output required to produce one dollar's worth of industry *b*'s output. v_{ab} measures the per-dollar basis commodity flow from *a* to *b* along the supply chain, with *b* as a downstream industry of *a*. Conversely, I divide x_{ba} by the dollar amount of industry *a*'s total output to get v_{ba}, namely the dollar value of industry *b*'s output required to product one dollar's worth of industry *a*'s output. v_{ba} measures the per-dollar basis commodity flow from *b* to *a* along the supply chain, with *b* as an upstream industry of *a*. *Vertical Relatedness* is defined as

[21] See details of the calculation in Appendix A.

the average of the upstream and downstream coefficients between industry *a* and *b*, $V_{ab} = \frac{v_{ab} + v_{ba}}{2}$.

The second measure is *Complementarity*, which represents the degree of overlap between primary and minor industries in their input and output markets. The overlap in input structures between industry *a* and *b* (ci_{ab}) is measured by the simple correlation coefficient between input requirement coefficients v_{ka} and v_{kb} across all intermediate industry *k* except for *a* and *b*. To measure the overlap in output structures, I first compute the percentage of industry *a*'s output supplied to each intermediate industry *k*, denoted as s_{ak}. For each pair of industries *a* and *b*, the overlap in output structures (co_{ab}) is measured by the simple correlation coefficient between s_{ak} and s_{bk} across all *k* except for *a* and *b*. *Complementarity* is defined as the average of the input and output correlation coefficients, $C_{ab} = \frac{co_{ab} + ci_{ab}}{2}$.

Appendix B provides several examples for the construction of relatedness measures. For example, consider the petroleum and coal products industry (*a*). In 2012, the airline industry (*b*) consumed $42,475 million petroleum and coal (x_{ab}) and in total generated $171,342 million output ($Q_b$). On the other hand, the petroleum and coal products industry only consumed $195 million worth output from the airline industry (x_{ba}) when its total output value was $811,280 million ($Q_a$). On a per dollar basis, the airline industry needs $0.2479 (42,475/171,342) petroleum and coal for each dollar of output generated (v_{ab}), whereas the petroleum and coal products industry consumed $0.0002 (195/811,280) output from the airline industry for each dollar of petroleum and coal produced (v_{ba}). The vertical relatedness between the two industries is 0.1241 [(0.2479+0.0002)/2], which indicates the average input transfers between the two

industries on a per dollar basis. The correlation of input flows between the two industries is -0.0346 (ci_{ab}), whereas the correlation of their output flows is 0.1191(co_{ab}). The complementarity between the two industries is 0.0422 [(-0.0346 +0.1191)/2].

For each multi-industry firm *i*, I calculate *Vertical Relatedness* and *Complementarity* between its primary industry (*p*) and each minor industry (*m*). For firms with more than one minor industry, firm-level *Vertical Relatedness* and *Complementarity* equals the average across all minor industries, value-weighted by minor-industry sales. Therefore, two firm-level relatedness measures (V_i and C_i) are defined as follows:

$$V_i = \sum_{m=1}^{M} w_m \times V_{pm},$$

and

$$C_i = \sum_{m=1}^{M} w_m \times C_{pm},$$

where w_m is the % of sales generated from minor industry *m*; V_{pm} and C_{pm} are the vertical relatedness and complementarity between primary industry *p* and minor industry *m*; and M is the total number of minor industries.

The above IO-based relatedness measures are well-suited for my study because two dimensions of relatedness (horizontal and vertical) can be measured at the same time and the commodity flow data are easily accessible from the BEA's website. Although the BEA updates annual tables with a three-year lag, the relatedness measures are very stable and do not change much in three years.[22] It is thus safe to assume that IO-based measures in the concurrent year approximate the information available for investors on the relatedness between the primary and

[22] The autocorrelation coefficients of *Vertical Relatedness* between year *t* and year *t-1, t-2, t-3* are 0.993, 0.987, and 0.982, respectively; the autocorrelation coefficients of *Complementarity* between year *t* and year *t-1, t-2, t-3* are 0.993, 0.987, and 0.978, respectively.

minor industries. The BEA provides annual input-output commodity flows for years between 1997 and 2013.

Table 1: Sample Selection

	# of Firm-quarters	# of Multi-industry Early Announcers	# of Pure-industry Obs
NYSE, AMEX, and NASDAQ firms with December fiscal year-ends and analyst following, 1998 to 2013	131,404		
minus:			
Firms with large segment sales deviations or no industry generating more than 50% of total sales	(31,396)		
Firms in financial or unclassified industries	(17,087)		
Firms in industries (defined by NAICS 3-digit codes) of less than five members	(3,489)		
Firms without sufficient data to compute control variables	(10,612)		
Sample before Hand-collection	68,820	3,213	53,792
minus:			
Multi-industry early announcers without any pure-industry peers announcing earnings at least three trading days later		(194)	
Multi-industry early announcers in fourth quarters		(830)	
Multi-industry early announcers without quarterly segment information from 10-Qs		(218)	
Multi-industry early announcers whose minor industries account for less than 5% of total sales		(400)	
Pure-industry firms without any same-industry peers announcing earnings at least three trading days in advance			(2,634)
Final Sample		**1,571**	**51,158**

CHAPTER 4: EMPIRICAL ANALYSES

4.1 Distribution of Multi-industry Firms

Table 2 presents the distribution of multi-industry firms in the sample before hand-collection. Multi-industry firms, although only representing 21.8% of the entire sample, account for 32.0% of early announcers and 51.7% of the market capitalization of early announcers. The overrepresentation of multi-industry firms in early announcers is likely driven by multi-industry firms' larger economic magnitudes. Prior literature has shown that larger firms provide timelier earnings announcements, because they have more resources to expedite the financial reporting process and face greater information demand from investors (Dyer and McHugh 1975; Givoly and Palmon 1982). These considerations likely outweigh possible reporting delays caused by the complexity of multi-industry operations (Sengupta 2004).

4.2 Descriptive Statistics

Table 3 provides descriptive statistics for the final sample. Panel A describes the 1,571 multi-industry early announcers and Panel B describes the 51,158 pure-industry firms. Multi-industry early announcers on average have 1.318 minor industries, which contribute 22.7% of consolidated sales. Their mean and median earnings announcement abnormal returns (*EARLYCAREAD*) are higher than those of pure-industry later announcers (*CAREAD*), consistent with prior evidence that good earnings news tends to be announced earlier than bad earnings news (see, e.g., Givoly and Palmon 1982). 83.9% of pure-industry firms have at least one multi-industry firm announcing earnings before them. Minor industries contribute a mean of 7.6% to the sales of all earlier announcers, but the percentage could be as high as 49.3%.

Panel C reports the Pearson correlation coefficients between multi-industry early announcers' primary-industry and minor-industry earnings news, by the degree of interindustry

relatedness. The correlation coefficients are statistically significant in all three terciles of *Vertical Relatedness*, but decrease as *Vertical Relatedness* goes up. The decreasing magnitude is consistent with a negative correlation in profits between vertically related businesses as one uses the other's output (revenue) as input (costs). However, this does not conflict with the prediction in H1 that earnings news from minor industries with higher vertical relatedness is more relevant to primary-industry peers, since peer firms do not have the direct contractual relationship with the minor industry counterparties that leads to a negative correlation in profits. Correlations by *Complementarity* show that primary- and minor-industry earnings news are not significantly correlated when *Complementarity* is low. The correlation in earnings news between the two industries becomes statistically significant and monotonically increases as *Complementarity* goes up.

4.3 Tests of H1

Table 4 reports the estimation results for H1 in a sample of multi-industry early announcers matched to multiple later-announcing pure-industry peers. The first three columns establish the average relation in earnings. After controlling for primary-industry earnings news, minor-industry earnings news is not significantly associated with pure-industry peers' earnings news on average (column 3). The next six columns report how the predictive power of minor-industry earnings news varies with minor industries' relatedness to the primary industry. Column 4 to 6 show that the association between minor-industry earnings news and pure-industry firms' earnings news increases with *Vertical Relatedness* and becomes significant and positive in the highest *Vertical Relatedness* tercile. Results by *Complementarity* terciles in column 7 to 9 exhibit a similar trend, albeit not statistically significant. The evidence suggests that minor-industry earnings news becomes more informative about later announcers' earnings news as interindustry

relatedness goes up (H1).

4.4 Tests of H2

Table 5 Panel A reports the tests of *H2*—whether investors of later announcers react more positively to early announcers' minor-industry earnings news when the minor industries are more related to the primary industry. The pattern of investor reaction around multi-industry firms' earnings announcements is very different from the relations in fundamental earnings. First, column 4 shows that investor price response to peer firms' minor-industry news is positive and statistically significant even after controlling for the primary-industry news. Second, column 5-10 show that investors of later announcers do not react as H2 predicts. On the contrary, they react more to low-relatedness minor-industry earnings news. In particular, the association between investor price response and minor-industry news in the lowest *Complementarity* tercile is positive and significant, which is opposite to the negative and insignificant relation in fundamental earnings. The evidence indicates that around multi-industry firms' earnings announcements, investors of later announcers overreact to earnings news from minor industries that are unrelated to the primary industry.

Panel B of Table 5 explores the impact of investor sophistication on later announcers' price reaction. I focus on early announcers operating in low- or medially-related minor industries, the news from which is less-relevant to later announcers. The sample is further partitioned into two based on later announcers' average institutional ownership. Under both measures of interindustry relatedness, the association between later announcers' price response and minor-industry news is positive and statistically significant when later announcers' institutional ownership is low, but not significant when institutional ownership is high. These subsample results suggest that overreaction to peers' minor-industry news concentrates in later

announcers with low investor sophistication.

4.5 Tests of H3 and H4

Table 6 investigates the degree of overreaction in information transfers, which is indicated by a negative correlation between later announcers' stock returns around their own earnings releases and their price response to all earlier earnings announcements. Panel A reports the impact of minor-industry news (H3a and H3b) and Panel B reports the impact of interindustry relatedness (H3c). Panel C examines how investor sophistication moderates the strength of overreaction (H4).

In Panel A, column 1 replicates Thomas and Zhang (2008) and confirms the existence of average overreaction in intra-industry information transfers. Column 2 to 4 examine the returns predicted by primary- and minor-industry earnings news separately. The evidence suggests that there is overreaction to minor-industry earnings news (α_2 = - 0.4%, t = -2.73), but under-reaction to primary-industry earnings news (α_1 = 0.3%, t = 2.03). The finding reconciles the overreaction documented by Thomas and Zhang (2008) with the seemingly contradictory underreaction documented by Ramnath (2002).

Column 5-7 and 8-10 of Panel A further shed lights on the source of overreaction documented by Thomas and Zhang (2008). I construct two measures of the extent to which earlier announcers operate in non-primary industries. Results from both measures show consistently that overreaction is concentrated in earlier announcers with more minor-industry news. In particular, there is no significant return reversal when all earlier announcers are pure-industry firms (*MULIND* = 0).

Panel B of Table 6 examines whether overreaction is concentrated in pure-industry firms whose earlier announcers have low-related primary and minor industries (H3c). The evidence is

consistent with H3c. When *Vertical Relatedness* or *Complimentary* between the primary and minor industries is high, the price reversal is not statistically significant or only marginally significant. Taken together, Panel A and Panel B provide consistent evidence that investor limited attention to peer firms' segment components leads to overreaction in information transfers.

Panel C of Table 6 analyzes how investor sophistication moderates the strength of overreaction to minor-industry news (H4). The reversal related to minor-industry earnings news, as well as the return reversal related to later announcers' initial price response, is concentrated in later announcers with low institutional holdings. When later announcers have high institutional holdings, there is no significant evidence of overreaction. The results corroborate the notion that investors' inefficient use of other firms' segment disclosures drives the previously documented overreaction.

4.6 Hedge Portfolios based on Minor-industry News

To further assess the magnitude of overreaction, I construct hedge portfolios based on earlier announcers' minor-industry earnings news. Each quarter, I sort all pure-industry later announcers into two groups. A long position in later announcers with minor-industry news below median and a short position in later announcers with minor-industry news above median yield a market-adjusted hedge return of 0.266% over two days, which translates to 33.53% annualized return based on an average of 252 trading days per year. The hedge return is statistically significant, after controlling for biases identified in prior studies. A t-statistic based on the time-series distribution of hedge portfolio returns equals 2.65 (Fama and MacBeth 1973). Following Lyon, Barber, and Tsai (1999), I also evaluate the significance based on an empirically generated distribution of hedge returns. 2000 pseudo portfolios are constructed each quarter by randomly

drawing pseudo earnings announcement dates from any trading days in the year after the actual earnings announcement dates of later announcers. The empirical distribution shows that the hedge return is significant at $p=0.001$.

Table 2: Distribution of Multi-industry Firms

		Multi-industry Firms					Pure-Industry Firms	
Year	*Total # of Firm-Quarters*	*as % of all obs*	*as % of Early Announcers*	*as % of Early Announcers' Market Cap.*	*Median Market Cap. ($M)*	*Median Sales ($M)*	*Median Market Cap. ($M)*	*Median Sales ($M)*
1998	3623	25.8%	34.6%	49.2%	1088	317	333	68
1999	3872	23.7%	34.5%	56.5%	868	275	309	68
2000	3794	23.2%	35.9%	50.9%	1050	361	423	77
2001	3516	23.2%	31.5%	50.8%	1319	433	429	71
2002	3978	21.7%	30.2%	55.9%	1237	345	334	58
2003	4294	21.3%	31.1%	62.3%	1184	383	402	64
2004	4459	21.3%	31.0%	54.6%	1593	390	532	72
2005	4592	20.8%	33.5%	46.0%	1772	346	576	79
2006	4579	20.6%	32.8%	51.9%	1950	334	607	85
2007	4546	19.6%	31.1%	49.2%	2157	375	628	92
2008	4591	19.9%	30.5%	51.2%	1567	449	477	101
2009	4767	20.0%	27.6%	50.2%	1130	375	382	87
2010	4866	20.3%	31.4%	45.7%	1561	407	562	108
2011	4610	22.2%	32.7%	45.5%	1787	454	691	127
2012	4357	23.4%	30.6%	58.3%	2035	518	755	132
2013	4376	24.2%	33.9%	52.3%	2684	551	919	133
All Years	**68820**	**21.8%**	**32.0%**	**51.7%**	**1563**	**397**	**510**	**87**

This table presents the proportion of multi-industry firms in early announcers. Multi-industry and pure-industry firms are identified based on the COMPUSTAT Historical Segment database. Early announcers are the first three announcers of quarterly earnings in each industry. Proportions in terms of frequency and market capitalization are calculated for multi-industry firms among early announcers. The table also reports the median market capitalization and quarterly sales for multi-industry firms and pure-industry firms, respectively. The sample consists of 68,820 firm-quarter observations, including all NYES, AMEX and NASDAQ firms with December fiscal year-ends and analyst coverage from 1998 to 2013.

Table 3: Descriptive Statistics

	Mean	Median	SD	Min	Max
Panel A: Multi-industry Early Announcers (N = 1571)					
# of Minor Industries	1.318	1.000	0.513	1.000	4.000
Minor-Industry Sales Pct.	0.227	0.212	0.119	0.051	0.498
EARLYUE (%)	-0.059	-0.003	2.216	-9.056	8.927
EARLYUE_PRIMARY (%)	-0.074	0.002	2.294	-9.764	9.438
EARLYUE_MINOR (%)	0.021	-0.003	0.817	-3.469	3.803
Vertical Relatedness	0.033	0.015	0.056	0.000	0.357
Complementarity	0.422	0.402	0.250	-0.061	1.000
EARLYCAREAD (%)	0.398	0.353	6.253	-19.556	19.470
# of Later-announcing Pure-industry Peers	34.390	9.000	86.507	1.000	945.000
Avg. # of Trading Days between EADs	8.580	8.500	2.771	3.000	41.000
RESP (%)	0.063	-0.030	3.160	-9.279	12.032
PRET	-0.003	0.009	0.135	-0.430	0.372
Panel B: Pure-industry Firms (N = 51158)					
UE (%)	-0.122	-0.041	8.809	-671.353	439.372
CAREAD (%)	-0.112	-0.119	8.902	-27.459	26.526
# of Earlier-announcing Peers	27.427	14.000	32.985	1.000	174.000
MULIND	0.839	1.000	0.368	0.000	1.000
SALEPCT_MINOR	0.076	0.057	0.078	0.000	0.493
AVG_RESP (%)	0.185	-0.011	3.494	-9.862	13.292
AVG_EARLYUE_PRIMARY (%)	0.116	0.147	0.968	-4.584	3.729
AVG_EARLYUE_MINOR (%)	0.005	0.003	0.082	-0.412	0.348
SIZE	6.230	6.143	1.561	2.962	10.303
BM	0.513	0.415	0.433	-0.255	2.417
PREADRET	0.001	0.000	0.227	-0.675	0.698

Panel C: Correlations between Primary- and Minor-industry Earnings News

	N	Corr (*EARLYUE_PRIMARY, EARLYUE_MINOR*)		p-value
By *Vertical Relatedness*:				
Lowest Tercile	532	0.333	***	(0.000)
Middle Tercile	526	0.224	***	(0.000)
Highest Tercile	513	0.161	***	(0.000)
By *Complementarity*:				
Lowest Tercile	539	0.055		(0.201)
Middle Tercile	518	0.296	***	(0.000)
Highest Tercile	514	0.529	***	(0.000)

The sample includes 1,571 multi-industry early announcers and 51,158 pure-industry firms from 1998 to 2013. Unexpected earnings (*UE*) and abnormal returns (*CAREAD, RESP*) variables are multiplied by 100 for concise presentation. All unbounded variables are winsorized at 1% and 99%. See Appendix A for definitions of variables.

Panel C reports how the correlations between multi-industry early announcers' primary- and minor-industry earnings news vary with respect to interindustry relatedness. *Vertical Relatedness* and *Complementarity* are sorted into terciles by year. Pearson correlation coefficients are reported for each tercile and two-tail p-values are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: The Association between Multi-industry Early Announcers' Earnings News and Later Announcers' Earnings News

Y = UE	*Pred. Sign*				**Z = Vertical Relatedness**			**Z = Complementarity**		
					Full Sample	Low Z	High Z	Full Sample	Low Z	High Z
Intercept	?	-0.001	-0.001	-0.001	-0.001	-0.000	-0.001	-0.001	-0.001	-0.000
		(-1.05)	(-1.09)	(-1.05)	(-0.79)	(-0.57)	(-0.55)	(-1.51)	(-1.55)	(-0.28)
EARLYUE_PRIMARY	+	0.084***		0.080***	0.083***	0.113***	0.070*	0.073**	0.089*	0.049
		(3.09)		(2.85)	(3.05)	(2.69)	(1.82)	(2.50)	(1.95)	(1.41)
EARLYUE_MINOR	?		0.092**	0.033	-0.077	-0.078	0.428***	-0.032	-0.038	0.105
			(2.30)	(0.78)	(-1.41)	(-1.21)	(3.75)	(-0.43)	(-0.46)	(1.13)
Z	?				-0.000			0.001		
					(-0.09)			(1.23)		
*Z * EARLYUE_MINOR*	**H1: +**				0.386***			0.125		
					(3.34)			(1.03)		
UE_{t-1}		0.414***	0.415***	0.414***	0.414***	0.460***	0.369***	0.414***	0.434***	0.421***
		(17.72)	(17.66)	(17.73)	(17.77)	(16.51)	(11.77)	(17.75)	(12.54)	(15.57)
UE_{t-4}		-0.326***	-0.326***	-0.326***	-0.326***	-0.299***	-0.378***	-0.326***	-0.269***	-0.303***
		(-7.64)	(-7.62)	(-7.63)	(-7.63)	(-7.00)	(-6.84)	(-7.62)	(-5.96)	(-5.51)
High - Low	**H1: +**					0.506***			0.143	
(F-stat)						(12.03)			(0.77)	
#obs		22,760	22,760	22,760	22,760	6,112	5,732	22,760	5,614	8,306
R2		0.321	0.320	0.321	0.322	0.356	0.340	0.322	0.313	0.345
Cluster SE		By Firm and Quarter			By Firm and Quarter			By Firm and Quarter		

This table reports the usefulness of early announcers' segment earnings news in predicting yet-to-announce pure-industry peers' concurrent earnings news. The sample includes 1,571 multi-industry early announcers (*i*) matched with multiple later-announcing pure-industry peers (*j*) in the primary industry. The first three columns report average results. Column 4-6 and 7-9 report how minor-industry earnings news' predicting power varies with its relatedness with the primary industry. Column 4(7) interacts *EARLYUE_MINOR* with the tercile ranks of *Vertical Relatedness* (*Complementarity*), with ranks bounded to [0, 1]. Column 5-6 (8-9) report the earnings relations in the lowest and highest terciles of *Vertical Relatedness* (*Complementarity*). Coefficients of *EARLYUE_MINOR* are compared across sub-samples by F-test. Unless otherwise stated, t-statistics are reported in parentheses under coefficients. All variables are winsorized at 1% and 99%. See Appendix A for definitions of variables. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Later Announcers' Return Response around Multi-industry Early Announcers' Earnings Releases

Panel A: Full Sample Results

Y = RESP	*Pred. Sign*					Z = Vertical Relatedness			Z = Complementarity		
						Full Sample	Low Z	High Z	Full Sample	Low Z	High Z
Intercept	?	-0.014	-0.012	-0.014	-0.013	-0.013	-0.014	-0.016	-0.013	-0.010	-0.009
		(-1.43)	(-1.27)	(-1.50)	(-1.39)	(-1.34)	(-0.81)	(-1.16)	(-1.28)	(-0.84)	(-0.82)
EARLYCAREAD	+	0.087***									
		(5.61)									
EARLYUE_PRIMARY	+		0.144***		0.141***	0.140***	0.158**	0.118	0.142***	0.178**	0.057
			(2.83)		(2.82)	(2.80)	(2.10)	(1.15)	(2.79)	(2.04)	(0.70)
EARLYUE_MINOR	?			0.289**	0.271**	0.406**	0.479**	0.223	0.559***	0.674***	0.101
				(2.62)	(2.64)	(2.35)	(2.35)	(0.61)	(3.70)	(4.98)	(0.35)
Z	?					-0.001			-0.001		
						(-0.28)			(-0.28)		
*Z * EARLYUE_MINOR*	**H2: +**					-0.332			-0.726**		
						(-0.81)			(-2.38)		
SIZE		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
		(1.20)	(1.08)	(1.25)	(1.17)	(1.19)	(0.59)	(0.91)	(1.13)	(0.57)	(0.70)
BM		0.007	0.007	0.008*	0.008	0.007	0.010	0.009	0.008	0.008*	0.005
		(1.59)	(1.50)	(1.76)	(1.61)	(1.60)	(1.16)	(1.23)	(1.64)	(1.79)	(0.73)
PRET		-0.009	-0.009	-0.009	-0.008	-0.008	-0.009	-0.001	-0.008	-0.018	0.032
		(-0.88)	(-0.88)	(-0.87)	(-0.84)	(-0.82)	(-0.62)	(-0.07)	(-0.86)	(-0.92)	(1.64)
High - Low	**H2: +**						-0.256			-0.573	
(F-stat)							(0.35)			(2.79)	
#obs		1,571	1,571	1,571	1,571	1,571	532	513	1,571	539	514
R2		0.037	0.019	0.012	0.022	0.023	0.043	0.013	0.025	0.047	0.021
Cluster SE		By Quarter				By Quarter			By Quarter		

This table reports the average stock return reaction of yet-to-announce peers around multi-industry early announcers' earnings announcements. The full sample includes 1,571 multi-industry early announcers (*i*). The first four columns of Panel A report full sample results. Column 5-7 and 8-10 report how the response to minor-industry earnings news varies with minor industries' relatedness to the primary industry. Column 5(8) interacts *EARLYUE_MINOR* with the tercile ranks of *Vertical Relatedness* (*Complementarity*), with ranks bounded to [0, 1]. Column 6-7 (9-10) report the response in the lowest and highest terciles of *Vertical Relatedness* (*Complementarity*). Coefficients of *EARLYUE_MINOR* are compared across sub-samples by F-test. Unless otherwise noted, t-statistics are reported in parentheses under coefficients. See Appendix A for definitions of variables. *** p<0.01, ** p<0.05, * p<0.1.

Panel B: By Investor Sophistication

Y = RESP	*Pred. Sign*	Low or Medium *Vertical Relatedness*		Low or Medium *Complementarity*	
		Low IO	**High IO**	**Low IO**	**High IO**
Intercept	?	-0.013	-0.009	-0.014	-0.011
		(-0.81)	(-0.64)	(-0.78)	(-0.87)
EARLYUE_PRIMARY	+	0.098	0.189***	0.146	0.176***
		(1.10)	(2.89)	(1.65)	(2.72)
EARLYUE_MINOR	?	0.378***	0.185	0.523***	0.036
		(3.18)	(1.05)	(3.21)	(0.23)
SIZE		0.001	0.001	0.001	0.001
		(0.70)	(0.46)	(0.62)	(0.53)
BM		0.008	0.006	0.009	0.009
		(1.10)	(0.91)	(1.34)	(1.19)
PRET		-0.018	-0.005	-0.026*	-0.016
		(-1.02)	(-0.33)	(-1.81)	(-1.11)
Low- High	+	0.193		0.487 **	
(F-stat)		(0.80)		(5.22)	
#obs		543	515	548	509
R2		0.024	0.038	0.045	0.039
Cluster SE		By Quarter		By Quarter	

Panel B reports how the price response to multi-industry early announcers' minor-industry news varies with later announcers' investor sophistication. The sample is restricted to multi-industry early announcers in the bottom two terciles of *Vertical Relatedness* (*Complementarity*). Later announcers' average price response is reported based on their average institutional ownership, for the low IO (below-quarter-median) sample and high IO (above-quarter-median) sample separately. Unless otherwise noted, t-statistics are reported in parentheses under coefficients. See Appendix A for definitions of variables. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Later Announcers' Stock Returns around Their Own Earnings Announcements

Panel A: The Impact of Minor-industry News

Y = CAREAD	*Pred. Sign*					M = MULIND			M = SALEPCT_MINOR		
						Full Sample	M = 0	M =1	Full Sample	Low M	High M
Intercept		-0.015***	-0.015***	-0.014***	-0.014***	-0.008**	0.007	-0.018***	-0.014***	-0.006	-0.011**
		(-5.04)	(-5.64)	(-4.73)	(-5.10)	(-2.38)	(1.16)	(-5.69)	(-4.41)	(-1.35)	(-2.62)
AVG_RESP	-	-0.092***				-0.030	-0.037	-0.113***	-0.035	-0.042	-0.148***
		(-5.90)				(-0.94)	(-1.12)	(-6.98)	(-1.31)	(-1.51)	(-4.91)
AVG_EARLYUE_PRIMARY	?		0.001		0.003**						
			(0.95)		(2.03)						
AVG_EARLYUE_MINOR	**H3a: -**			-0.002*	-0.004***						
				(-1.73)	(-2.73)						
M	?					-0.006***			-0.002		
						(-4.75)			(-1.35)		
M AVG_RESP*	**H3b: -**					-0.085**			-0.128***		
						(-2.61)			(-3.03)		
SIZE		0.002***	0.002***	0.002***	0.002***	0.002***	-0.001	0.002***	0.002***	0.001	0.002***
		(5.05)	(5.20)	(5.25)	(5.14)	(4.44)	(-0.98)	(5.56)	(5.01)	(1.56)	(2.69)
BM		0.005***	0.004***	0.004***	0.004***	0.005***	0.005	0.004***	0.005***	0.003	0.003
		(3.12)	(2.90)	(2.87)	(2.84)	(3.05)	(1.40)	(2.79)	(3.11)	(1.25)	(1.15)
PREADRET		-0.003	-0.007***	-0.007**	-0.007***	-0.002	0.001	-0.003	-0.002	-0.003	-0.002
		(-1.05)	(-2.67)	(-2.65)	(-2.67)	(-0.81)	(0.10)	(-0.97)	(-0.94)	(-0.56)	(-0.37)
$CAREAD_{t-1}$		0.016***	0.016***	0.016***	0.016***	0.015***	0.015	0.014**	0.015***	0.019**	-0.005
		(2.98)	(3.13)	(3.12)	(3.10)	(2.84)	(1.19)	(2.53)	(2.96)	(2.38)	(-0.48)
$CAREAD_{t-4}$		0.014***	0.013***	0.013***	0.013**	0.013**	0.018	0.012**	0.014***	0.019**	0.005
		(2.76)	(2.67)	(2.68)	(2.64)	(2.64)	(1.44)	(2.20)	(2.75)	(2.06)	(0.67)
#obs		51,158	51,158	51,158	51,158	51,158	8,247	42,911	51,158	15,563	15,058
R2		0.003	0.002	0.002	0.002	0.004	0.002	0.004	0.003	0.001	0.004
Cluster SE		By Quarter				By Quarter			By Quarter		

This table examines later announcers' stock returns around their own earnings releases. The full sample includes 51,158 pure-industry firms (*j*). Panel A reports the impact of minor-industry news. Column 1 replicates the results of Thomas and Zhang (2008). Column 4 examines the reaction to primary- and minor-industry earnings news, separately. Column 5-7 and 8-9 investigate how the degree of overreaction varies with the amount of minor-industry news from earlier announcers (*M*). See Appendix A for definitions of variables. *** p<0.01, ** p<0.05, * p<0.1.

Panel B: The Impact of Interindustry Relatedness

Y = CAREAD	*Pred. Sign*	Z = Vertical Relatedness			Z = Complementarity		
		Full Sample	Low Z	High Z	Full Sample	Low Z	High Z
Intercept	?	-0.015***	-0.007	-0.010**	-0.016***	-0.014***	-0.012***
		(-5.16)	(-1.34)	(-2.35)	(-5.40)	(-2.74)	(-2.66)
AVG_RESP	-	-0.130***	-0.116***	-0.045*	-0.147***	-0.131***	-0.030
		(-6.09)	(-4.93)	(-1.74)	(-6.36)	(-5.26)	(-1.15)
Z	?	0.001			0.002**		
		(1.21)			(2.07)		
*Z * AVG_RESP*	**H3c: +**	0.073**			0.104***		
		(2.18)			(2.84)		
SIZE		0.002***	0.001*	0.001**	0.002***	0.002***	0.001***
		(5.08)	(1.96)	(2.34)	(5.09)	(3.21)	(2.76)
BM		0.005***	-0.002	0.006**	0.005***	-0.001	0.007**
		(3.14)	(-0.87)	(2.57)	(3.15)	(-0.22)	(2.58)
PREADRET		-0.003	-0.001	-0.003	-0.003	-0.001	-0.004
		(-1.03)	(-0.16)	(-0.59)	(-0.97)	(-0.25)	(-0.74)
$CAREAD_{t-1}$		0.016***	-0.002	0.017**	0.015***	0.006	0.018**
		(2.97)	(-0.23)	(2.05)	(2.92)	(0.74)	(2.14)
$CAREAD_{t-4}$		0.014***	0.013	0.012	0.014***	0.018**	0.015
		(2.75)	(1.55)	(1.30)	(2.74)	(2.53)	(1.49)
High - Low	**H3c: +**		0.071**			0.101***	
(F-stat)			(4.56)			(7.60)	
#obs		51,158	17,111	17,023	51,158	17,135	16,994
R2		0.003	0.003	0.002	0.003	0.005	0.002
Cluster SE			By Quarter			By Quarter	

Panel B examines how the relatedness between the primary and minor industries of earlier announcers influences overreaction in information transfers. The first columns of each *Z* interact the tercile ranks of Z with *AVG_RESP*, with ranks bounded to [0, 1]. The second and third columns of each Z compare the coefficient estimates of *AVG_RESP* between the lowest and highest terciles of *Z* by F-test. See Appendix A for definitions of variables. *** p<0.01, ** p<0.05, * p<0.1.

Panel C: The Degree of Overreaction by Investor Sophistication

Y = CAREAD	*Pred.*	*Full Sample*		*MULIND=1*		Above Median *SALEPCT_MINOR*		Low or Medium *Vertical Relatedness*		Low or Medium *Complementarity*	
	Sign	**Low IO**	**High IO**	**Low IO**	**High IO**	**Low IO**	**High IO**	**Low IO**	**High IO**	**Low IO**	**High IO**
Intercept		-0.018***	0.002	-0.018***	-0.002	-0.019***	0.000	-0.017***	-0.000	-0.014***	-0.001
		(-4.70)	(0.36)	(-4.45)	(-0.37)	(-3.39)	(0.06)	(-3.98)	(-0.00)	(-3.28)	(-0.19)
AVG_RESP				-0.135***	-0.058*	-0.139***	-0.062*	-0.145***	-0.051	-0.155***	-0.067*
				(-5.19)	(-1.86)	(-4.40)	(-1.70)	(-4.85)	(-1.47)	(-5.36)	(-1.91)
AVG_EARLYUE_PRIMARY		0.006**	0.001								
		(2.43)	(0.34)								
AVG_EARLYUE_MINOR		-0.005**	-0.003								
		(-2.09)	(-1.27)								
SIZE		0.002**	0.000	0.002**	0.000	0.002**	0.000	0.002**	0.000	0.001	0.000
		(2.61)	(0.18)	(2.39)	(0.56)	(2.39)	(0.05)	(2.26)	(0.21)	(1.50)	(0.40)
BM		0.007***	0.001	0.007***	0.002	0.007**	0.003	0.006**	0.002	0.005**	0.002
		(3.42)	(0.47)	(3.25)	(0.93)	(2.37)	(1.13)	(2.33)	(0.76)	(2.15)	(0.68)
PREADRET		-0.013***	0.002	-0.010**	0.005	-0.010**	0.005	-0.012***	0.007	-0.010**	0.005
		(-3.83)	(0.38)	(-2.51)	(0.87)	(-2.16)	(0.82)	(-2.74)	(1.11)	(-2.37)	(0.80)
$CAREAD_{t-1}$		0.035***	-0.003	0.029***	-0.005	0.031***	-0.011	0.043***	-0.014	0.038***	-0.010
		(4.22)	(-0.31)	(3.29)	(-0.51)	(2.66)	(-0.80)	(4.60)	(-1.24)	(4.27)	(-0.87)
$CAREAD_{t-4}$		0.013	0.017*	0.009	0.021*	0.005	0.012	0.015	0.014	0.009	0.019
		(1.61)	(1.75)	(1.04)	(1.91)	(0.46)	(0.91)	(1.60)	(1.22)	(1.07)	(1.63)
Low- High	**H4: -**	-0.002		-0.077**		-0.077**		-0.094**		-0.088**	
(F-stat)		(0.03)		(5.81)		(4.68)		(6.97)		(6.08)	
#obs		17,070	17,032	15,160	13,493	8,658	8,124	11,850	10,818	11,986	10,752
R2		0.005	0.000	0.007	0.001	0.008	0.001	0.009	0.001	0.008	0.001
Cluster SE		By Quarter		By Quarter		By Quarter		By Quarter		By Quarter	

Panel C reports how the strength of overreaction to minor-industry news varies with investor sophistication. Each quarter, later announcers are ranked into terciles based on institutional ownership (*IO*). Return reversals related to earlier-announced minor-industry earnings news and earlier announcers' low-relatedness minor-industry businesses are reported for the lowest *IO* and highest *IO* terciles, separately. Unless otherwise noted, t-statistics are reported in parentheses under coefficients. See Appendix A for definitions of variables. *** p<0.01, ** p<0.05, * p<0.1.

CHAPTER 5: CONCLUSION

This paper investigates how investor limited attention affects intra-industry information transfers from multi-industry firms. Specifically, I examine how segment earnings news of a multi-industry peer informs earnings of later-announcing firms in the multi-industry peer's primary industry. In addition, I examine how investors of later announcers react to the multi-industry firm's segment earnings news. To formally derive predictions for investor reactions, I provide a simple model that considers investor limited attention to peer firms' industry segments. The model predicts that investors who neglect peer firms' segment information will overreact to the uninformative component of multi-industry peers' earnings. Consistent with this prediction, I find empirical evidence that investors positively react to multi-industry peers' minor-industry earnings news when the minor-industry news is not associated with their own firms' earnings.

The initial overreaction is corrected at later announcers' own earnings releases, which leads to predictable reversals. I find that later announcers' stock returns around their own earnings releases are negatively associated with earlier announcers' minor-industry earnings news. Furthermore, the reversal in later announcers' stock returns is *stronger* when earlier announcers operate to a greater extent in minor industries, and when the relatedness between primary and minor industries is lower. Cross-sectional analyses show that the overreaction related to minor-industry news is concentrated in later announcers with less-sophisticated investors. These findings are consistent with predictions from my limited attention model. Overall, my evidence suggests that the average investor is inattentive to peer firms' segment disclosures in intra-industry information transfers.

My study is informative for financial statement users, who claim the importance of segment reporting but seem not fully tapping its potential in information transfers. For regulators

and standard setters, I show that the impact of segment disclosures on stock market efficiency can be magnified to many peer firms through information transfers. This positive externality should be taken into account in future rulemaking. Lastly, my study contributes to the information transfer literature by reconciling the overreaction in Thomas and Zhang (2008) and the underreaction in Ramnath (2002) in a limited attention framework.

REFERENCES

Baginski, S. P. 1987. Intraindustry Information Transfers Associated with Management Forecasts of Earnings. *Journal of Accounting Research* 25 (2): 196–216.

Baldwin, B. A. 1984. Segment Earnings Disclosure and the Ability of Security Analysts to Forecast Earnings Per Share. *The Accounting Review* 59 (3): 376–389.

Bartov, E., S. Radhakrishnan, and I. Krinsky. 2000. Investor Sophistication and Patterns in Stock Returns after Earnings Announcements. *The Accounting Review* 75 (1): 43–63.

Bens, D. A., P. G. Berger, and S. J. Monahan. 2011. Discretionary Disclosure in Financial Reporting: An Examination Comparing Internal Firm Data to Externally Reported Segment Data. *The Accounting Review* 86 (2): 417–449.

Berger, P. G., and R. Hann. 2003. The Impact of SFAS No. 131 on Information and Monitoring. *Journal of Accounting Research* 41 (2): 163–223.

Berger, P. G., and R. N. Hann. 2007. Segment Profitability and the Proprietary and Agency Costs of Disclosure. *The Accounting Review* 82 (4): 869–906.

Bernard, V. L., and J. K. Thomas. 1989. Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium? *Journal of Accounting research* 27 (1989): 1–36.

Bernard, V. L., and J. K. Thomas. 1990. Evidence that Stock Prices Do Not Fully Reflect the Implications of Current Earnings for Future Earnings. *Journal of Accounting and Economics* 13 (4): 305–340.

Bhojraj, S., C. M. C. Lee, and D. K. Oler. 2003. What's My Line? A Comparison of Industry Classification Schemes for Capital Market Research. *Journal of Accounting Research* 41 (5): 745–774.

Botosan, C. A., S. McMahon, and M. H. Stanford. 2009. Representationally Faithful Disclosures, Organizational Design and Managers' Segment Reporting Decisions. Working Paper.

Botosan, C. A., and M. Stanford. 2005. Managers' Motives to Withhold Segment Disclosures and the Effect of SFAS no. 131 on Analysts' Information Environment. *The Accounting Review* 80 (3): 751–771.

Bradshaw, M. T., S. A. Richardson, and R. G. Sloan. 2001. Do Analysts and Auditors Use Information in Accruals? *Journal of Accounting Research* 39 (1): 45–74.

Cen, L., K. Chan, S. Dasgupta, and N. Gao. 2013. When the Tail Wags the Dog: Industry Leaders, Limited Attention, and Spurious Cross-Industry Information Diffusion. *Management Science* 59 (11): 2566–2585.

Clarke, R. N. 1989. SICs as Delineators of Economic Markets. *The Journal of Business* 62 (1): 17–31.

Collins, D. W. 1975. SEC Product-line Reporting and Market Efficiency. *Journal of Financial Economics* 2 (2): 125–164.

Dechow, P. M., S. A. Richardson, and R. G. Sloan. 2008. The Persistence and Pricing of the Cash Component of Earnings. *Journal of Accounting Research* 46 (3): 537–566.

Durnev, A., and C. Mangen. 2009. Corporate Investments: Learning from Restatements. *Journal of Accounting Research* 47 (3): 679–720.

Dyer, J. C., and A. J. McHugh. 1975. The Timeliness of the Australian Annual Report. *Journal of Accounting Research* 13 (2): 204–219.

Epstein, M. J., and K. G. Palepu. 1999. What Financial Analysts Want. *Strategic Finance* 80 (10): 48.

Ettredge, M. L., S. Y. Kwon, D. B. Smith, and P. A. Zarowin. 2005. The Impact of SFAS no. 131 Business Segment Data on the Market's Ability to Anticipate Future Earnings. *The Accounting Review* 80 (3): 773–804.

Fama, E. F., and J. D. MacBeth. 1973. Risk, Return, and Equilibrium: Empirical Tests. *The Journal of Political Economy*: 607–636.

Fan, J. P. H., and L. H. P. Lang. 2000. The Measurement of Relatedness: An Application to Corporate Diversification. *The Journal of Business* 73 (4): 629–660.

Firth, M. 1976. The Impact of Earnings Announcements on the Share Price Behaviour of Similar Type Firms. *The Economic Journal* 86 (342): 296–306.

Foster, G. 1977. Quarterly Accounting Data: Time-Series Properties and Predictive-Ability Results. *The Accounting Review* 52 (1): 1–21.

Foster, G. 1981. Intra-industry Information Transfers Associated with Earnings Releases. *Journal of Accounting and Economics* 3 (3): 201–232.

Foster, G., C. Olsen, and T. Shevlin. 1984. Earnings Releases, Anomalies, and the Behavior of Security Returns. The Accounting Review 59 (4): 574–603.

Freeman, R., and S. Tse. 1992. An Earnings Prediction Approach to Examining Intercompany Information Transfers. *Journal of Accounting and Economics* 15 (4): 509–523.

Givoly, D., and D. Palmon. 1982. Timeliness of Annual Earnings Announcements: Some Empirical Evidence. *The Accounting Review* 57 (3): 486–508.

Gleason, C. A., N. T. Jenkins, and W. B. Johnson. 2008. The Contagion Effects of Accounting Restatements. *The Accounting Review* 83 (1): 83–110.

Golden, R. G. 2016. From the Chairman's Desk. Available at: http://www.fasb.org/jsp/FASB/Page/SectionPage&cid=1176167771158.

Han, J. C. Y., and J. J. Wild. 1990. Unexpected Earnings and Intraindustry Information Transfers: Further Evidence. *Journal of Accounting Research* 28 (1): 211–219.

Han, J. C. Y., J. J. Wild, and K. Ramesh. 1989. Managers' Earnings Forecasts and Intra-industry Information Transfers. *Journal of Accounting and Economics* 11 (1): 3–33.

Hand, J. R. M. 1990. A Test of the Extended Functional Fixation Hypothesis. *The Accounting Review* 65 (4): 740–763.

Hann, R. N., and Y. Y. Lu. 2008. Earnings Management at the Segment Level. Working Paper.

Hilary, G., and R. Shen. 2013. The Role of Analysts in Intra-Industry Information Transfer. *The Accounting Review* 88 (4): 1265–1287.

Hirshleifer, D., K. Hou, and S. H. Teoh. 2011. The Accrual Anomaly: Risk or Mispricing? *Management Science* 58 (2): 320–335.

Hirshleifer, D., Kewei Hou, S. H. Teoh, and Yinglei Zhang. 2004. Do Investors Overvalue Firms with Bloated Balance Sheets? *Journal of Accounting and Economics* 38: 297–331.

Hirshleifer, D., S. S. Lim, and S. H. Teoh. 2011. Limited Investor Attention and Stock Market Misreactions to Accounting Information. *Review of Asset Pricing Studies* 1 (1): 35–73.

Hirshleifer, D., and S. H. Teoh. 2003. Limited Attention, Information Disclosure, and Financial Reporting. *Journal of Accounting and Economics* 36 (1–3): 337–386.

Kahneman, D. 1973. *Attention and Effort*. Citeseer.

Kale, J. R., and H. Shahrur. 2007. Corporate Capital Structure and the Characteristics of Suppliers and Customers. *Journal of Financial Economics* 83 (2): 321–365.

Kim, Y., M. Lacina, and M. S. Park. 2008. Positive and Negative Information Transfers from Management Forecasts. *Journal of Accounting Research* 46 (4): 885–908.

Kinney, W. R., Jr. 1971. Predicting Earnings: Entity versus Subentity Data. *Journal of Accounting Research* 9 (1): 127–136.

Knutson, P. H. 1993. *Financial Reporting in the 1990s and Beyond*. Charlottesville, VA: AIMR.

Koo, D. S., J. (Julie) Wu, and P. E. Yeung. 2014. Earnings Attribution and Information Transfers. Working Paper.

Krishnan, J., and E. Press. 2003. The North American Industry Classification System and Its Implications for Accounting Research*. *Contemporary Accounting Research* 20 (4): 685–717.

Lail, B. E., W. B. Thomas, and G. J. Winterbotham. 2014. Classification Shifting Using the "Corporate/Other" Segment. *Accounting Horizons* 28 (3): 455–477.

Levi, S. 2008. Voluntary Disclosure of Accruals in Earnings Press Releases and the Pricing of Accruals. *Review of Accounting Studies* 13 (1): 1–21.

Louis, H., D. Robinson, and A. Sbaraglia. 2008. An Integrated Analysis of the Association between Accrual Disclosure and the Abnormal Accrual Anomaly. *Review of Accounting Studies* 13 (1): 23–54.

Lyon, J. D., B. M. Barber, and C.-L. Tsai. 1999. Improved Methods for Tests of Long-Run Abnormal Stock Returns. *The Journal of Finance* 54 (1): 165–201.

Mendenhall, R. R. 1991. Evidence on the Possible Underweighting of Earnings-Related Information. *Journal of Accounting Research* 29 (1): 170–179.

Ramnath, S. 2002. Investor and Analyst Reactions to Earnings Announcements of Related Firms: An Empirical Analysis. *Journal of Accounting Research* 40 (5): 1351–1376.

Richardson, S. A., R. G. Sloan, M. T. Soliman, and İ. Tuna. 2005. Accrual Reliability, Earnings Persistence and Stock Prices. *Journal of Accounting and Economics* 39 (3): 437–485.

Richardson, S., İ. Tuna, and P. Wysocki. 2010. Accounting Anomalies and Fundamental Analysis: A Review of Recent Research Advances. *Journal of Accounting and Economics* 50 (2–3): 410–454.

Saunders, N. C. 1999. The North American Industry Classification System: Change on the Horizon. *Occupational Outlook Quarterly* Fall: 34–37.

Sengupta, P. 2004. Disclosure Timing: Determinants of Quarterly Earnings Release Dates. *Journal of Accounting and Public Policy* 23 (6): 457–482.

Shahrur, H. 2005. Industry Structure and Horizontal Takeovers: Analysis of Wealth Effects on Rivals, Suppliers, and Corporate Customers. *Journal of Financial Economics* 76 (1): 61–98.

Sloan, R. G. 1996. Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings? *Accounting Review* 71 (3): 289–315.

Teoh, S. H., and T. J. Wong. 2002. Why New Issues and High-Accrual Firms Underperform: The Role of Analysts' Credulity. *Review of Financial Studies* 15 (3): 869–900.

Thomas, J., and F. Zhang. 2008. Overreaction to Intra-industry Information Transfers? *Journal of Accounting Research* 46 (4): 909–940.

Tversky, A., and D. Kahneman. 1974. Judgment under Uncertainty: Heuristics and Biases. *Science* 185 (4157): 1124–1131.

Verrecchia, R. E. 2001. Essays on Disclosure. *Journal of Accounting and Economics* 32 (1–3): 97–180.

Walther, B. R. 1997. Investor Sophistication and Market Earnings Expectations. *Journal of Accounting Research* 35 (2): 157–179.

Wang, C. 2014. Accounting Standards Harmonization and Financial Statement Comparability: Evidence from Transnational Information Transfer. *Journal of Accounting Research* 52 (4): 955–992.

Appendix A: Variable Definitions

Variables for each Multi-industry Early Announcer *i*:

EARLYUE

Early announcer *i*'s firm-level unexpected earnings in quarter t, which equal seasonally-adjusted changes in operating income after depreciation, scaled by *i*'s market value of equity at the end of quarter *t* ($\frac{OIADP_t - OIADP_{t-4}}{MVE_t}$).

EARLYUE_PRIMARY

Unexpected earnings from *i*'s primary industry, which equal the primary industry's seasonally-adjusted changes in operating profits, scaled by *i*'s market value of equity at the end of quarter *t* ($\frac{OPS\_IND_{p,t} - OPS\_IND_{p,t-4}}{MVE_t}$).

Operating profits of each segment are hand collected from segment disclosures in 10-Qs and then aggregated into industry-level profits for each firm-quarter. Industry is defined by NAICS 3-digit codes.

EARLYUE_MINOR

Unexpected earnings from *i*'s minor industries, which equal the sum of all minor industries' seasonally-adjusted changes in operating profits, scaled by *i*'s market value of equity at the end of quarter *t* ($\sum_{1}^{M} \frac{OPS\_IND_{m,t} - OPS\_IND_{m,t-4}}{MVE_t}$).

Operating profits of each segment are hand collected from segment disclosures in 10-Qs and then aggregated into industry-level profits for each firm-quarter. Industry is defined by NAICS 3-digit codes.

Vertical Relatedness

The degree to which *i*'s primary industry and minor industries are vertically related along the supply chain.

Following Fan and Lang (2000), vertical relatedness between any two industries *a* and *b* is measured by the average of the dollar value of industry *a*'s output to produce one dollar's worth of industry *b*'s output (v_{ab}) and the dollar value of industry *b*'s output to produce one dollar's worth of industry *a*'s output (v_{ba}), namely $V_{ab} = \frac{v_{ab} + v_{ba}}{2}$.[23]

I calculate vertical relatedness between the primary industry and each minor industry. For firms with more than one minor industry, firm-level vertical relatedness equals the average across all minor industries, value-weighted by minor-industry sales.

Complementarity

The degree of overlap between *i*'s primary industry and minor industries in their input and output markets.

Following Fan and Lang (2000), complementarity between any two industries *a*

[23] The commodity flows between each pair of industries are obtained from the *Use* Table of annual benchmark input-output accounts of the U.S. Economy, available at the Bureau of Economic Analysis. See Chapter 3.3 and Appendix B for details and examples of the construction of *Vertical Relatedness* and *Complementarity*.

and *b* is measured by the average of the correlation coefficient between *a* and *b* in output structures (co_{ab}) and the correlation coefficient between *a* and *b* in input structures (ci_{ab}), namely $C_{ab} = \frac{co_{ab} + ci_{ab}}{2}$.

I calculate complementarity between the primary industry and each minor industry. For firms with more than one minor industry, firm-level complementarity equals the average across all minor industries, value-weighted by minor-industry sales.

EARLYCAREAD — Early announcer *i*'s market-adjusted cumulative abnormal returns over the two-day window [0, +1] around its announcement of quarter *t* earnings.

RESP — Yet-to-announce pure-industry peers' stock return response to *i*'s earnings announcement, which is measured by the average of all yet-to-announce pure-industry peers' market-adjusted cumulative abnormal returns during days [0, +2] around *i*'s earnings announcement.

PRET — Yet-to-announce pure-industry peers' stock returns before *i*'s earnings announcement, which is measured by the average of all yet-to-announce pure-industry peers' size- and book-to-market-adjusted cumulative abnormal returns during the [-63, -2] window relative to *i*'s earnings announcement.

Variables for each Later-announcing Pure-industry Firm *j*:

UE — Pure-industry firm *j*'s firm-level unexpected earnings in quarter *t*, computed as the seasonally-adjusted changes in operating income after depreciation and scaled by *j*'s market value of equity at the end of quarter *t* ($\frac{OIADP_t - OIADP_{t-4}}{MVE_t}$).

UE_{t-1} is *j*'s *UE* in quarter *t-1*.

UE_{t-4} is *j*'s *UE* in quarter *t-4*.

CAREAD — Pure-industry firm *j*'s market-adjusted cumulative abnormal returns over the two-day window [0, +1] around its announcement of quarter *t* earnings.

$CAREAD_{t-1}$ is *j*'s *CAREAD* in quarter *t-1*.

$CAREAD_{t-4}$ is *j*'s *CAREAD* in quarter *t-4*.

MULIND — An indicator variable equal 1 if there is at least one multi-industry firm announcing quarter *t* earnings three trading days before *j*, and 0 if all earlier announcers are pure-industry firms.

Firms are classified as multi- or pure-industry firms based on annual segment disclosures in the fiscal year before quarter *t*. Annual segment information is obtained from the COMPUSTAT Historical Segment database.

SALEPCT_MINOR — % of minor-industry sales from all firms announcing earnings at least three trading days before firm *j*. Low *SALEPCT_MINOR* is defined as the decile rank of *SALEPCT_MINOR* <= 0.3; high *SALEPCT_MINOR* is defined as the decile rank of *SALEPCT_MINOR* >= 0.7.

	For each earlier announcer of firm *j* in quarter *t*, % of sales generated from minor industries is measured by the annual % in the fiscal year before quarter *t*, based on annual segment data. The percentages are then averaged across all earlier announcers, value-weighted by each earlier announcer's market value of equity at the end of quarter *t*. Here I did not use hand-collected quarterly segment information because hand-collected data are only available for the first three early announcers. Annual segment data provide full coverage for all firms announcing before *j*. In addition, I use the previous fiscal year's annual segment data to ensure that such information is publicly available at the earnings announcement of quarter *t*.
AVG_RESP	Firm *j*'s stock return response to all earlier earnings announcements in the same industry, computed as the average of *j*'s market-adjusted cumulative abnormal returns during days [0, +2] around each earlier earnings announcement in quarter *t*.
AVG_EARLYUE_PRIMARY	Primary-industry earnings news from all firms announcing earnings at least three trading days before firm *j*. For each earlier announcer in quarter *t*, primary-industry unexpected earnings equal firm-level unexpected earnings in quarter *t* multiplied by annual primary-industry sales % in the fiscal year before quarter *t*. Primary-industry unexpected earnings are then averaged across all earlier announcers, value-weighted by each earlier announcer's market value of equity at the end of quarter *t*.
AVG_EARLYUE_MINOR	Minor-industry earnings news from all firms announcing earnings at least three trading days before firm *j*. For each earlier announcer in quarter *t*, minor-industry unexpected earnings equal firm-level unexpected earnings in quarter *t* multiplied by annual minor-industry sales % in the fiscal year before quarter *t*. Minor-industry unexpected earnings are then averaged across all earlier announcers, value-weighted by each early announcer's market value of equity at the end of quarter *t*.
IO	The % of common shares held by institutions at the end of quarter *t*. Firms are ranked into terciles of *IO* by calendar quarter.
SIZE	The natural logarithm of *j*'s market value of equity at the end of quarter *t*.
BM	Firm *j*'s book-to-market ratio, computed as the book value of equity in quarter *t* divided by the market value of equity at the end of quarter *t*.
PREADRET	Firm *j*'s size- and book-to-market-adjusted cumulative abnormal returns during the [-63, -2] window before *j*'s earnings announcement.

Appendix B: An Illustration of the Interindustry Relatedness Measures

Industry *a*	**Petroleum and Coal Products** (3-digit NAICS code = 324)			
Industry *b*	**Oil and gas extraction**	**Air transportation**	**Food and beverage stores**	**Publishing industries**
3-digit NAICS Code	211	481	445	511
Industry *a*'s output used by industry *b* ($m): x_{ab}	2,050	42,475	725	276
Total output of industry *b* ($m): Q_b	301,253	171,342	184,836	286,945
Value of *a*'s output used to produce $1 of *b*'s output: $v_{ab} = x_{ab} / Q_b$	0.0068	0.2479	0.0039	0.0010
Industry *b*'s output used by industry *a* ($m): x_{ba}	526,053	195	2	6
Total output of industry *a* ($m): Q_a	811,280	811,280	811,280	811,280
Value of *b*'s output used to produce $1 of *a*'s output: $v_{ba} = x_{ba} / Q_a$	0.6484	0.0002	0.0000	0.0000
Vertical Relatedness: $V_{ab} = \frac{v_{ab} + v_{ba}}{2}$	**0.3276**	**0.1241**	**0.0020**	**0.0005**
Correlation between *a* and *b* in input flows: $ci_{ab} = Corr(v_{ka}, v_{kb})$, for *k* = 1…n except for *a* and *b*	0.7227	-0.0346	-0.0529	-0.0472
Correlation between *a* and *b* in output flows: $co_{ab} = Corr(s_{ak}, s_{bk})$, for *k* = 1…n except for *a* and *b*	0.1830	0.1191	0.4959	-0.0968
Complementarity: $C_{ab} = \frac{ci_{ab} + co_{ab}}{2}$	**0.4529**	**0.0422**	**0.2215**	**-0.0720**

Source: The 2012 *Use* table of the benchmark input-output accounts, available from the Bureau of Economic Analysis.