Institutional Ownership and the Extent to which Stock Prices Reflect Future Earnings*

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Abstract

Articles in the financial press suggest that institutional investors are overly focused on current profitability, which suggests that as institutional ownership increases, stock prices reflect less *current period* information that is predictive of *future period* earnings. On the other hand, institutional investors are often characterized in academic research as sophisticated investors and sophisticated investors should be better able to use current-period information to predict future earnings compared with other owners. According to this characterization, as institutional ownership increases, stock prices should reflect more current-period information that is predictive of future period earnings. Consistent with this latter view, we find that the extent to which stock prices lead earnings is positively related to the percentage of institutional ownership. This result holds after controlling for various factors that affect the relation between price and earnings. It also holds when we control for endogenous portfolio choices of institutions (e.g., institutional investors may be attracted to firms in richer information environments where stock prices tend to lead earnings). Further, a regression of stock returns on order backlog, conditional on the percentage of institutional ownership, indicates that institutional owners place more weight on order backlog compared with other owners. This result is consistent with institutional owners using non-earnings information to predict future earnings. It also explains, in part, why prices lead earnings to a greater extent when there is a higher concentration of institutional owners.

Keywords Earnings; Institutional investors; Investor sophistication; Stock prices

Condensé

Selon les articles publiés dans la presse financière, les investisseurs institutionnels exhorteraient les dirigeants à atteindre les objectifs de profit à court terme aux dépens de la valeur nette à long terme (voir, par exemple, Chote et Linger, 1986 ; Dobrynski *et al.*, 1986 ; Drucker,

* Accepted by John Wild. We acknowledge comments from two anonymous referees, the associate editor, Holly Ashbaugh, Ramji Balakrishnan, Bob Bowen, Brian Bushee, Tom Carroll, Bob Jacobson, Maureen McNichols, Karen Nelson, K. R. Subramanyam, and workshop participants at the University of Arizona and the 1997 Stanford Accounting Summer Camp. Discussions with Terry Shevlin have been especially helpful. James Jiambalvo and Shiva Rajgopal appreciate funding from the Accounting Development Fund at the University of Washington. Mohan Venkatachalam appreciates funding from the Financial Research Initiative at Stanford University Graduate School of Business.

1986 ; Coffee, 1991 ; Jacobs, 1991 ; Teitelman, 1993). Porter (1992), quant à lui, est d'avis que les investisseurs institutionnels accordent *trop* d'importance aux résultats à court terme, ce qui laisse supposer qu'ils n'en accordent pas suffisamment à l'information prévisionnelle annonçant les résultats des périodes *futures*. Par contre, les investisseurs institutionnels sont souvent dépeints comme des investisseurs avisés qui bénéficient de certains avantages dans l'acquisition et le traitement de l'information, comparativement aux investisseurs individuels (voir Hand, 1990 ; Kim, Krinsky et Lee, 1997 ; Bartov, Radhakrishnan et Krinsky, 2000). Si les investisseurs institutionnels sont avisés, ils doivent être plus à même d'utiliser l'information de la période courante pour prévoir les résultats futurs (comparativement aux autres investisseurs), et les cours en vigueur devraient refléter davantage l'information relative aux résultats des périodes futures à mesure que la participation institutionnelle augmente. Ce point de vue présuppose, à l'instar de Walther (1997) et Bartov *et al.* (2000), que la probabilité qu'un investisseur marginal soit un investisseur avisé augmente avec le pourcentage de participation des investisseurs institutionnels.

L'on sait que le cours des titres est précurseur des résultats (Kothari et Sloan, 1992). Cela tient au fait que, même si toutes les opérations économiques effectuées par une société ne se manifestent pas nécessairement dans les résultats de la période courante, l'information relative à ces opérations (en ce qui a trait, par exemple, aux commandes des clients, aux contrats de vente à long terme et aux activités d'investissement) est accessible aux investisseurs. Les opérations en question finiront néanmoins par transparaître dans les résultats des périodes futures. Les auteurs estiment que les investisseurs avisés qui bénéficient de certains avantages dans l'acquisition et le traitement de l'information appréhenderont une plus grande proportion d'information relative aux résultats futurs qui ne transparaît pas dans les résultats de la période courante lorsqu'ils prendront des décisions d'investissement. Dans la mesure où les investisseurs institutionnels sont plus avisés que les autres investisseurs, la proportion d'information relative aux résultats futurs, par rapport aux résultats de la période courante, qui transparaît dans le cours des titres en vigueur devrait augmenter avec le pourcentage de participation institutionnelle. En conséquence, les auteurs testent l'hypothèse suivante :

HYPOTHÈSE 1 *La proportion d'information relative aux résultats futurs, par rapport aux résultats de la période courante, qui transparaît dans le cours des titres en vigueur est en relation positive avec le niveau de participation institutionnelle.*

Une méthode susceptible de remplacer celle qui consiste à tester si les investisseurs institutionnels sont plus avisés que les autres investisseurs consiste à déterminer si la valeur de l'information prévisionnelle qui transparaîtra dans les résultats futurs est influencée par le pourcentage de participation institutionnelle. Les auteurs considèrent le carnet de commandes comme l'un de ces éléments d'information prévisionnelle qui se manifeste dans les résultats futurs (Lev et Thiagarajan, 1993). S'il est vrai que les investisseurs institutionnels sont plus avisés que les autres investisseurs, les auteurs affirment que l'information relative au carnet de commandes qui transparaît dans le cours des titres en vigueur devrait augmenter avec la participation institutionnelle. Ils testent donc l'hypothèse suivante :

HYPOTHÈSE 2 *La mesure dans laquelle l'information relative au carnet de commandes transparaît dans le cours des titres est en relation positive avec le pourcentage de participation institutionnelle.*

Pour réaliser leurs tests empiriques, les auteurs puisent leurs données à deux sources. Premièrement, ils recueillent l'information relative à la participation des investisseurs dans la base de données sur l'information publiée par les entreprises, distribuée par Disclosure Incorporated, pour les années 1989 à 1995. Parmi ces données figure le pourcentage de titres en circulation appartenant aux institutions et aux entreprises. Cette information relative aux participations est reprise dans la base de données tirée des fichiers 13-F, 13-D, 13-G et 14-D ainsi que des formulaires 3 et 4 de la SEC. Les auteurs puisent ensuite les données financières et les données relatives au cours des titres dans les fichiers annuels Compustat 1995.

L'échantillon définitif contient 9 840 observations entreprises-année. L'échantillon de départ est constitué de données sur la participation institutionnelle pour 38 221 entreprises-année au cours de la période 1989–1995, provenant de la base de données sur l'information publiée. De ces observations entreprises-année, un certain nombre sont absentes des fichiers Compustat, ce qui ramène l'échantillon à 15 703 entreprises-année. Les auteurs rejettent également 5 309 entreprises-année pour lesquelles les données relatives au suivi des analystes ne sont pas disponibles dans les fichiers IBES. Ce tri s'impose pour contrôler la possibilité que le suivi des analystes soit en corrélation avec la participation institutionnelle et que la présence des prévisions des analystes facilite l'évaluation par le marché des résultats futurs ou du carnet de commandes de la période en cours. Afin d'éviter que les observations extrêmes n'influent sur leurs inductions, les auteurs éliminent 554 observations qui se situent dans les tranches supérieure et inférieure de 1 pour cent des distributions de rendements et de résultats. L'application de ce procédé de sélection donne 9 840 observations entreprises-année pour l'analyse empirique.

Pour étudier l'influence du pourcentage de participation institutionnelle sur l'étendue de l'information relative aux résultats futurs reflétée dans les rendements, les auteurs procèdent à deux tests. Ils estiment d'abord l'équation suivante :

$$R_{it,\,t-\tau} = \omega_0 + \omega_{1(\tau)}\, E_{it}/P_{it-\tau} + \omega_{2(\tau)}\, (E_{it} \times INST_{it-\tau}/P_{it-\tau}) + \varepsilon_{it-\tau}$$

où *R* représente les rendements, *E*, les résultats, *P*, le cours du titre et *INST*, le pourcentage de participation institutionnelle. L'équation est estimée pour $\tau = 1$ et $\tau = 2$ à l'aide d'une méthode de régression (SUR). En comparant $\omega_2\,(\tau = 1)$ avec $\omega_2\,(\tau = 2)$, les auteurs examinent l'influence de la participation institutionnelle sur la mesure dans laquelle l'information relative aux périodes futures transparaît dans le cours des titres en vigueur. Si le cours en vigueur des titres d'entreprises dans lesquelles la participation institutionnelle est plus élevée reflète davantage l'information relative aux résultats futurs, l'on devrait s'attendre à ce que la valeur de $\omega_2\,(\tau = 2)$ soit supérieure à celle de $\omega_2\,(\tau = 1)$.

Ensuite, les auteurs subdivisent la participation institutionnelle en quintiles et examinent le ratio $\omega_1\,(\tau = 2) / \omega_1\,(\tau = 1)$ de chacun de ces quintiles. Si les investisseurs institutionnels sont des investisseurs avisés, le cours des titres des entreprises dans lesquelles la participation institutionnelle est importante devrait refléter l'information relative aux résultats de la période plus tôt que le cours des titres d'entreprises dans lesquelles la participation institutionnelle est modeste. C'est pourquoi les auteurs prévoient que le ratio $\omega_1\,(\tau = 2) / \omega_1\,(\tau = 1)$ sera plus élevé pour les entreprises dans lesquelles la participation institutionnelle est importante que pour celles dans lesquelles cette participation est modeste.

Les tests suggérés ci-dessus permettent d'évaluer si les investisseurs institutionnels sont des investisseurs avisés qui font entrer l'information relative aux résultats futurs dans la

détermination du cours des titres. Ils ne permettent cependant pas de vérifier *directement* si les investisseurs institutionnels intègrent l'information prévisionnelle qui transparaîtra dans les résultats futurs. Pour résoudre ce problème, les auteurs considèrent le carnet de commandes comme un élément plausible d'information prévisionnelle. Ils estiment l'équation suivante pour analyser la mesure dans laquelle le cours des titres rend compte de l'information relative au carnet de commandes :

$$R_{it,\,t-1} = \gamma_0 + \gamma_1 E_{it} + \gamma_2\, BACKLOG_{it} + \gamma_3\, (BACKLOG_{it} \times INST_{it-1}) + \upsilon_{it-1}$$

où *BACKLOG* représente le carnet de commandes à la fin de la période *t* à l'égard de laquelle les résultats sont publiés, divisé par la valeur de marché décalée de l'entreprise. Il convient de noter que la variable dépendante dans cette équation est celle du rendement des titres évalué de $t-1$ jusqu'à *t*. Le carnet de commandes au temps *t* se reflète dans les rendements de cette période, puisque les investisseurs acquièrent de l'information au sujet du carnet de commandes au temps *t* en consultant les rapports trimestriels émis au cours de la période et diverses sources non comptables. Bien que l'information relative au carnet de commandes au temps *t* se reflète dans les rendements de $t-1$ à *t*, elle ne se reflète que dans les résultats subséquents à la période *t*.

Si le marché assimile l'information prévisionnelle comme celle qui a trait au carnet de commandes, les auteurs s'attendent à ce que γ_2 soit positif. Et si les investisseurs institutionnels sont avisés dans le traitement de cette information prévisionnelle, le cours des titres des entreprises dans lesquelles la participation des investisseurs institutionnels est importante est davantage susceptible de refléter l'information relative au carnet de commandes que celui des titres des entreprises dans lesquelles la participation des investisseurs institutionnels est plus faible. Il est donc prévisible que γ_3 soit positif. Toutefois, si les investisseurs institutionnels accordent trop d'importance aux résultats comptables de la période courante, la probabilité que le cours des titres reflète l'information relative au carnet de commandes, qui influe sur les résultats futurs, ne devrait pas être reliée au pourcentage de participation des investisseurs institutionnels.

Dans l'ensemble, les résultats de la présente étude confirment l'hypothèse voulant que les investisseurs institutionnels soient avisés. Les auteurs constatent que la mesure dans laquelle le cours des titres est précurseur des résultats est en relation positive avec le pourcentage de participation des investisseurs institutionnels. Cette observation résiste au contrôle des divers facteurs qui influent sur la relation entre le cours des titres et les résultats, comme la taille de l'entreprise, la valeur de marché par rapport à la valeur comptable et l'écart-type des résultats. Cette observation résiste également au contrôle de l'endogénéité relativement à la possibilité que les investisseurs institutionnels soient attirés par les entreprises qui évoluent dans un environnement plus riche en information, où le cours des titres tend à annoncer les résultats.

Les auteurs constatent également que la valeur de l'information relative au carnet de commandes augmente avec le pourcentage de participation des investisseurs institutionnels, ce qui explique, en partie, pourquoi les cours sont davantage annonciateurs des résultats lorsque le pourcentage de participation des investisseurs institutionnels est élevé — ces derniers étant davantage susceptibles, comparativement aux autres investisseurs, de tenir compte de l'information *prévisionnelle* ne portant pas sur les résultats.

Les observations des auteurs ne supposent cependant pas que *tous* les investisseurs institutionnels soient des investisseurs avisés et qu'ils soient davantage susceptibles de prendre en compte les résultats futurs dans l'établissement du cours des titres. De fait, Bushee (1998) suggère dans son étude qu'un sous-groupe d'investisseurs institutionnels (plus précisément ceux dont le portefeuille est diversifié et présente un taux de rotation élevé et dont la stratégie d'investissement est dictée par la tendance) accordent sans doute trop d'importance aux résultats à court terme. Quoi qu'il en soit, la présente étude contribue à ce débat en faisant la preuve qu'*en moyenne*, le cours des titres est davantage susceptible de refléter les résultats futurs lorsque le pourcentage de participation des investisseurs institutionnels est élevé, ce qui confirme l'hypothèse voulant que les investisseurs institutionnels bénéficient de certains avantages dans l'acquisition et le traitement de l'information. Cette étude présente une faiblesse : les auteurs n'examinent pas les profils des stratégies d'investissement des investisseurs institutionnels. Ils ne font donc pas de démonstration *directe* du mécanisme grâce auquel les investisseurs institutionnels influent sur la valeur de l'information contenue dans les résultats futurs. Il serait par conséquent souhaitable que les études à venir comblent cette lacune et que les chercheurs approfondissent le rôle que jouent les investisseurs avisés dans l'établissement du cours des titres.

1. Introduction

A number of articles in the financial press suggest that institutional investors pressure managers to achieve short-term profit goals at the expense of long-term equity value (e.g., Chote and Linger 1986; Dobrzynski, King, Miles, Norman, and Schiller 1986; Drucker 1986; Coffee 1991; Jacobs 1991; Teitelman 1993). According to Porter 1992, institutional investors are overly focused on short-term earnings. In contrast, institutional investors are often characterized as sophisticated investors who have advantages in acquiring and processing information compared with individual investors (e.g., Hand 1990; Kim, Krinsky, and Lee 1997; Bartov, Radhakrishnan, and Krinsky 2000). If institutional investors are sophisticated, they should be better able to use current-period information to predict future earnings (compared with other investors) and current-period stock prices should reflect more of the information in future-period earnings as institutional ownership increases.

The purpose of our study is to provide evidence on the extent to which stock prices lead earnings conditional on institutional ownership. We find that the extent to which stock prices lead earnings is positively related to the percentage of institutional ownership. This result holds after controlling for various factors that affect the relation between stock prices and earnings (e.g., firm size, market to book, and standard deviation of earnings). It also holds when we control for endogeneity related to the possibility that institutional investors are attracted to firms in richer information environments where stock prices tend to lead earnings.

We also use an alternative approach to provide corroborative evidence. We investigate whether the extent of pricing of forward-looking nonearnings information increases with the level of institutional ownership. One such example of forward-looking information that institutional owners may use to predict future earnings is order backlog. A regression of order backlog on stock returns, conditional on the percentage of institutional ownership, indicates that institutional owners place

more weight on order backlog compared with other owners.[1] This explains, in part, why prices lead earnings to a greater extent when institutional ownership is higher.

Overall, our results are consistent with the view that institutional owners are sophisticated investors whose information acquisition and processing advantages are reflected in stock prices. The results contradict the notion that institutional investors (compared with other investors) fixate on current earnings because current stock prices are more likely to reflect future earnings as institutional ownership increases. In fact, when institutional ownership is high, current prices appear to reflect more of the forward-looking nonearnings information. In addition to shedding light on the characterization of institutional investors, the results have implications for future studies investigating the relation between earnings surprises and stock returns. Controlling for institutional ownership may reduce measurement error in earnings surprise proxies because institutional owners are less likely to be surprised by future earnings realizations.

The remainder of our paper is organized as follows. In section 2 we briefly review related studies and develop our hypotheses. Section 3 outlines our research methodology and section 4 describes the data used in tests of hypotheses. Empirical findings are presented in section 5 and concluding comments are presented in the final section.

2. Hypothesis development

Institutional investors are often characterized as owners who are overly focused on current earnings. Porter (1992, 92) notes:

> Perhaps the most basic weakness in the American system is transient ownership in which institutional agents are drawn to current earnings, unwilling to invest in understanding the fundamental prospects of companies, and unable and unwilling to work with companies to build long-term earnings power.

In a recent study, Bushee (2001) regresses institutional ownership on firm value components related to expected near-term earnings and expected long-term earnings. For institutional investors classified as transient investors, Bushee reports convincing evidence of a preference for near-term earnings.

In contrast to the view that institutional owners are overly focused on current earnings information is the view that they are sophisticated investors with advantages in acquiring and processing information. This perspective is supported by a survey conducted by Shiller and Pound 1989, who find that institutional investors spend more time performing investment analysis. Lev (1988) argues that wealthy investors have access to information that is too costly for others to acquire. Given that institutional investors, on average, have more resources than individual investors, they are likely to be better informed.

Walther (1997) finds that in regressing stock returns on unexpected earnings measures, the weight on analysts' forecasts of earnings increases and the weight on seasonal random-walk forecasts of earnings decreases with the percentage of stock held by institutional investors. Because analysts' forecasts are more accurate than

seasonal random-walk forecasts, her result is consistent with the idea that institutional owners are more sophisticated than other owners. Further evidence on the sophistication of institutional owners is provided in a recent study conducted by Bartov et al. 2000.[2] They show that the pattern of observed post-earnings-announcement abnormal returns documented by Rendleman, Jones, and Latane 1987, Freeman and Tse 1989, and Bernard and Thomas 1990 is reduced as the proportion of firm shares held by institutional investors increases. Thus, institutional owners are more sophisticated than other owners in that they are more likely to appreciate the time-series implications of a quarterly earnings innovation.

Hypotheses

It is well known that stock prices lead earnings (Kothari and Sloan, 1992) because not all economic actions taken by the firm are reflected in current-period earnings, while information about such actions (e.g., information about customer orders, long-term sales contracts, and investment activities) is available to investors. Such economic actions, though not reflected in current earnings, will eventually be reflected in future-period earnings. We posit that sophisticated investors with advantages in acquiring and processing information will incorporate more information about future earnings that is not reflected in current earnings, when making investment decisions. If investors impound value-relevant information not reflected in current earnings, current stock prices will reflect information about future earnings after controlling for current earnings. To the extent that institutional investors are more sophisticated than other investors, the proportion of information on future earnings relative to current earnings, reflected in current-period stock prices, should increase with institutional ownership. This position assumes, as in Walther 1997 and Bartov et al. 2000, that the likelihood of a marginal investor being sophisticated increases with the percentage ownership by institutional investors.[3] Accordingly, we test the following hypothesis stated in alternative form:

HYPOTHESIS 1. *The proportion of information in future earnings relative to current earnings, reflected in current stock prices, is positively related to the level of institutional ownership.*

An alternative approach to testing whether institutional investors are more sophisticated than other investors is to investigate whether the pricing of forward-looking information that will be reflected in future earnings is influenced by the level of institutional ownership. We consider order backlog as one such item of forward-looking information that will be incorporated in future earnings (Lev and Thiagarajan 1993). To the extent that institutional investors are more sophisticated than other investors, we posit that information in order backlog reflected in current-period stock prices should increase with institutional ownership. Accordingly, we test the following hypothesis stated in alternative form:

HYPOTHESIS 2. *The extent to which information in order backlog is reflected in stock prices is positively related to the level of institutional ownership.*

3. Research method

We adopt an approach suggested by Kothari and Sloan 1992 to assess the extent to which stock prices reflect a greater proportion of information in future versus current earnings for institutional investors.[4] They note that stock prices impound information that will only later be reflected in accounting earnings and suggest an equation of the following form:

$$R_{it,\,t-\tau} = \omega_0 + \omega_{1(\tau)}(E_{it}/P_{it-\tau}) + \varepsilon_{it-\tau} \quad (1),$$

where $R_{it,\,t-\tau}$ is the buy-and-hold return for firm i over the period $t-\tau$ to t, E_{it} is income before extraordinary items for the accounting period ended at time t, and $P_{it-\tau}$ is the stock price at the end of period $t-\tau$. The market's response during the period $t-\tau$ to t to earnings information for the period ended at time t is represented by $\omega_{1(\tau)}$.

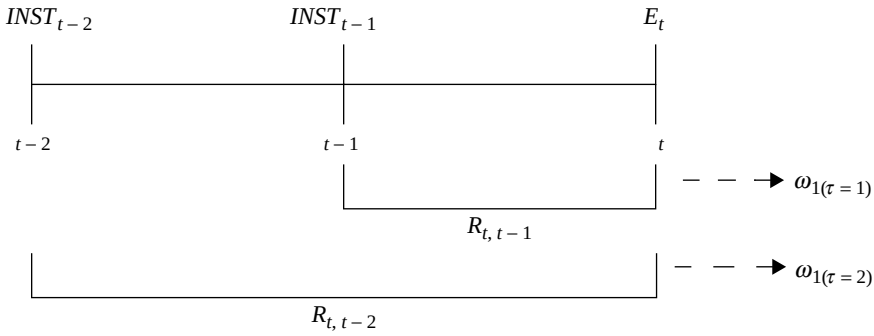
Because stock prices lead accounting earnings, as τ increases, it is more likely that the information contained in earnings at time t will be incorporated in the return over the period $t-\tau$ to t. This result occurs because capital market participants likely make use of information, related to current earnings, in earlier time periods. To the extent that information contained in current accounting earnings has already been incorporated in stock prices of a previous period, the coefficient $\omega_{1(\tau)}$ will get smaller (larger) as the time interval τ gets smaller (larger) — that is, $\omega_{1(\tau=2)} > \omega_{1(\tau=1)}$. Furthermore, the ratio of $\omega_{(\tau)}$ obtained for a longer time interval to that obtained for a shorter time interval $(\omega_{1(\tau=2)}/\omega_{1(\tau=1)})$ provides a measure of the extent to which information on current earnings has been impounded in prices in an earlier time period (see Figure 1). A higher ratio indicates that more information in current earnings has already been incorporated in past stock prices.

To examine the influence of the level of institutional ownership on the extent of information about future earnings impounded in returns, we conduct two tests. First, we interact the earnings term with the level of institutional ownership in place at the beginning of the return accumulation period and examine whether stock prices of firms with greater institutional ownership incorporate more information about future earnings. Measuring institutional ownership at the beginning of the return accumulation period allows institutional investors to influence the pricing of future earnings information. That is, we modify (1) as follows:

$$R_{it,\,t-\tau} = \omega_0 + \omega_{1(\tau)}(E_{it}/P_{it-\tau}) + \omega_{2(\tau)}[(E_{it} \times INST_{it-\tau})/P_{it-\tau}] + \varepsilon_{it-\tau} \quad (2),$$

where *INST* represents the percentage of institutional ownership. We estimate (2) for both $\tau = 1$ and $\tau = 2$ using a seemingly unrelated regression (SUR) approach. By comparing $\omega_{2(\tau=2)}$ with $\omega_{2(\tau=1)}$, we examine the influence of institutional ownership on the extent to which information in future periods is incorporated in current stock prices.[5] If current stock prices of firms with higher institutional ownership incorporate more information regarding future earnings, then we should expect $\omega_{2(\tau=2)}$ to be greater than $\omega_{2(\tau=1)}$.

Figure 1 Timeline underlying the research design related to Hypothesis 1



$R_{t,\,t-\tau}$ = stock return over the period $t-1$ to τ ($\tau = 1, 2$).

E_t = earnings for period ended at time t.

$\omega_{1(\tau=1)}$ = proportion of earnings information at time t (E_t) incorporated in stock prices during $t-1$ to t.

$\omega_{1(\tau=2)}$ = proportion of earnings information at time t (E_t) incorporated in stock prices during $t-2$ to t.

Ratio = $\dfrac{\omega_{1(\tau=2)}}{\omega_{1(\tau=1)}}$ = proportion of information in E_t incorporated in stock prices during period $(t-2, t)$ relative to $(t-1, t)$.

$INST_{t-\tau}$ = institutional ownership measured at the beginning of the return accumulation period $t-\tau$.

Next, we partition institutional ownership into quintiles and examine the ratio $(\omega_{1(\tau=2)}/\omega_{1(\tau=1)})$ across the ownership quintiles. If institutional owners are sophisticated investors, then the stock prices for firms with large institutional ownership should reflect information on current earnings earlier than the stock prices of firms with small institutional ownership. Therefore, we expect the ratio $(\omega_{1(\tau=2)}/\omega_{1(\tau=1)})$ to be higher for firms with large institutional ownership compared with firms with small institutional ownership.

The tests suggested above assess whether institutional investors are sophisticated investors who incorporate information about future earnings in determining share prices. However, they do not *directly* test whether institutional investors incorporate forward-looking information, which will be reflected in future earnings. To address this, we consider order backlog as a plausible piece of forward-looking information.[6] We estimate the following equation to examine the extent to which stock prices incorporate order backlog information:

$$R_{it,\,t-1} = \gamma_0 + \gamma_1 E_{it} + \gamma_2 BACKLOG_{it} + \gamma_3 (BACKLOG_{it} \times INST_{it-1}) + \upsilon_{it-1} \qquad (3),$$

where *BACKLOG* represents order backlog as of the end of the earnings reporting period t scaled by lagged market value of equity. Note that the dependent variable

in the equation is stock returns measured over $t - 1$ to t. Backlog at time t is reflected in returns over this period as investors learn about backlog at time t from quarterly reports issued during the period and nonaccounting sources. Although information on backlog at t is reflected in returns from $t - 1$ to t, it is only reflected in earnings beyond period t.

If the market impounds forward-looking information such as order backlog, we expect γ_2 to be positive. And if institutional owners are sophisticated in processing such forward-looking information, then the stock prices for firms with large institutional ownership are more likely to reflect the impact of backlog than firms with smaller institutional ownership. Thus, we expect γ_3 to be positive. However, if institutional investors are myopically focused on current accounting earnings, then the likelihood of stock prices reflecting backlog, which is reflected in future earnings, should not be related to institutional ownership.

4. Data

To conduct the empirical tests outlined in the previous section, we obtain data from two sources. First, we gather ownership data from the Disclosure data base distributed by Disclosure Incorporated for the years 1989 to 1995. The data base reports the percentage of outstanding shares owned by institutions and corporate owners. These ownership data are reproduced in the data base from SEC filings 13-F, 13-D, 13-G, 14-D, and Forms 3 and 4. In a comparative study of the reliability of ownership data from several data bases, Anderson and Lee (1997) conclude that the Disclosure data base ranks very favorably over peer data bases. Next, we obtain financial data and stock price data from the 1995 COMPUSTAT annual tapes.

The final sample consists of 9,840 firm-year observations. The sample selection procedure, summarized in Table 1, consists of three stages. We initially obtained a sample of institutional ownership data for 38,221 firm-years for the period 1989–95 from the Disclosure data base. Of these, a number of firms-years are not found in the 1995 COMPUSTAT tapes, thereby reducing the sample to 15,703 firm-years. We also dropped 5,309 firm-years for which data on analyst following are not available from the I/B/E/S tapes. This filter is necessary to control for the possibility that analyst following may be correlated with institutional ownership and the presence of analyst forecasts would facilitate the market's pricing of future earnings or order backlog in current periods. To prevent extreme observations from influencing our results, we eliminated 554 observations in the top and bottom 1 percent of the returns and earnings distributions.[7] The selection procedure yields 9,840 firm-year observations for our empirical analysis.

Panel A of Table 2 presents the descriptive statistics for the variables used in the empirical tests. Of particular interest is the level of institutional ownership as measured by the percentage of stockholdings relative to total shares outstanding. The mean (median) percentage institutional ownership is 39 (37) percent. The distribution of percentage institutional ownership is comparable to that reported in prior research (e.g., Eames 1997, Bushee 1998). For the median firm, institutional owners collectively own three times as much equity as managers (37 percent stake for institutions compared with 12 percent of managers). The mean and median

TABLE 1
Sample selection criteria

Firm observations in the Disclosure data base (1989–1995)	38,221
Less firms with no financial data or price data available in the 1995 COMPUSTAT data base	22,518
	15,703
Less analyst following data not available from I/B/E/S data base	5,309
	10,394
Less extreme values for earnings and returns	554
Final sample	9,840

total assets (unreported) are $3,510 million and $317 million, respectively. The average income before extraordinary items scaled by lagged market value is 0.04. Among the correlations reported (see panel B, Table 2), three correlation statistics are especially noteworthy. Firm size (*SIZE*), measured as the natural logarithm of market value of equity, is highly associated with percentage institutional ownership and the correlation between the two variables is 0.55 ($p < 0.01$). Hence, any analysis that does not control for firm size will face a potentially large omitted-variable bias. Similarly, the strong negative correlation between institutional ownership and managerial ownership (-0.32, $p < 0.01$) and the positive correlation between institutional ownership and analyst following (0.47, $p < 0.01$) highlight the importance of controlling for managerial ownership and analyst following in examining the effects of institutional ownership.

Panel C of Table 2 presents descriptive data comparing the average COMPUSTAT firm with the average firm used in our study. This comparison reveals that the mean firm in our sample is larger, has higher earnings per unit of size, and has lower trailing annual returns compared with the average COMPUSTAT firm. The characteristics of our sample firms are broadly similar to the ones that institutions find attractive as investments (see Gompers and Metrick 2001). We address the related self-selection issue in the section on endogeneity tests reported later in the paper.

5. Results

Analysis of the extent of future earnings reflected in stock prices

The results of estimating (2) are reported in Table 3. Recall that we need to estimate (2) for two time periods ($\tau = 1$ and 2). To facilitate the comparison of coefficients across time periods, we estimate (2) for both time periods as a SUR.[8] Recognizing that several factors affect the relation between earnings (E) and returns (R) as well as institutional ownership, we control for such factors by interacting earnings with those variables in our empirical analyses. Specifically, we control for managerial ownership (*MGR*), analyst following (*NANAL*), market to book (*MB*), leverage measured as the ratio of total debt to lagged total assets (*LEV*), earnings variability scaled by lagged total assets (*EVAR*), lagged earnings scaled by lagged market value of equity

(*E*), and firm size (*SIZE*). To be consistent with the measurement of institutional ownership, the control variables (*MGR*, *NANAL*, *MB*, *LEV*, *EVAR*, and *SIZE*) are also measured at the beginning of the return accumulation period. We include firm size and number of analysts to proxy for the information environment (Collins and Kothari 1989; Collins, Kothari, and Rayburn 1987) while market to book is a proxy for growth opportunities (Collins and Kothari 1989). Consistent with cited prior research, we expect a positive coefficient on the interaction of $E \times SIZE$, $E \times NANAL$, and $E \times MB$.

TABLE 2

Panel A: Descriptive statistics

Variable	Mean	Standard deviation	Median	First quartile	(n = 9,840) Third quartile
INST	0.39	0.22	0.37	0.21	0.56
MGR	0.19	0.21	0.12	0.03	0.29
SIZE	5.44	1.78	5.29	4.15	6.63
LEV	0.22	0.20	0.19	0.05	0.33
EVAR	0.08	0.32	0.04	0.02	0.07
MB	2.73	30.62	1.75	1.20	2.87
NANAL	7.63	8.10	4.00	2.00	10.50
E	0.04	0.11	0.06	0.02	0.09
R	0.19	0.52	0.11	−0.13	0.40

Panel B: Pearson correlation matrix

Variable	*MGR*	*SIZE*	*LEV*	*EVAR*	*MB*	*NANAL*	(n = 9,840) *E*	*R*
INST	**−0.32**	**0.55**	**−0.02**	**−0.08**	−0.00	**0.47**	**−0.05**	**0.03**
MGR		**−0.28**	−0.01	**0.04**	0.01	**−0.29**	**−0.05**	−0.00
SIZE			**0.03**	**−0.11**	**0.01**	**0.80**	**0.19**	**−0.06**
LEV				**−0.04**	−0.00	**0.04**	**−0.07**	−0.01
EVAR					**0.08**	**−0.08**	**−0.13**	0.01
MB						−0.00	−0.01	−0.01
NANAL							**0.10**	**−0.02**
E								**0.22**

Panel C: Descriptive statistics for different samples

	All COMPUSTAT firms (n = 40,972)		Full sample (n = 9,840)		Order backlog sample (n = 3,500)	
Variable	Mean	Median	Mean	Median	Mean	Median
SIZE	4.53	4.39	**5.44**	**5.29**	**4.93**	**4.79**
MB	3.58	1.67	2.73	**1.75**	**2.23**	1.68
E	−0.02	0.05	**0.04**	**0.06**	**0.03**	**0.06**
R	0.24	0.09	**0.19**	**0.11**	**0.19**	0.08

(The table is continued on the next page.)

TABLE 2 (Continued)

Notes:

Correlations that are statistically significant at the 5% level are shown in boldface type in panel B. Means and medians for subsamples that are statistically different and significant (at the 5% level) when compared with corresponding means and medians in COMPUSTAT are presented in boldface type in panel C. The sample comprises firm-year observations drawn from the 1989–95 fiscal years.

INST = percentage of equity shares held by institutional investors;

MGR = percentage of shares held by inside owners — that is, individuals (officers, directors, and principal owners) who can exercise significant influence over corporate affairs;

SIZE = natural logarithm of market value of equity;

LEV = ratio of total debt scaled by lagged total assets;

EVAR = standard deviation of annual earnings divided by lagged total assets;

NANAL = number of analysts following the firm;

MB = market-to-book ratio;

E = income before extraordinary items scaled by lagged market value of equity; and

R = annual stock return measured over the fiscal year.

An interaction term of earnings and earnings variability (measured by the standard deviation of annual earnings divided by lagged market value of equity) is included because studies of firm valuation have shown that earnings variability negatively affects earnings persistence and the earnings response coefficient (e.g., Collins et al. 1987; Kormendi and Lipe 1987; Collins and Kothari 1989). Hence, we expect a negative coefficient on $E \times EVAR$. Leverage and managerial ownership are included because they are related to accounting choices that affect the informativeness of earnings (Warfield, Wild, and Wild 1995). Because managers have greater incentives to manage accruals in the presence of covenant constraints attached to leverage, earnings quality and, thus, the earnings response coefficient are expected to be lower for firms with higher leverage. Hence, we predict a negative coefficient on $E \times LEV$. Managers with higher managerial ownership have fewer incentives to use accruals to dampen earnings quality suggesting a positive coefficient on $E \times MGR$. Lagged earnings scaled by lagged market value of equity, E_{t-1}, is added as a stand-alone term (not an interaction term) to reflect previous evidence of the importance of earnings changes in explaining returns (Easton and Harris 1991; Easton, Harris, and Ohlson 1992).

Table 3 presents the results of estimating (2) with and without including the control variables. Note that the coefficient on earnings for stock returns estimated over the longer window ($\tau = 2$) is 2.10, while the coefficient estimated for the shorter window ($\tau = 1$) is 0.80 (Wald statistic to test the equality of $\omega_{1(\tau=2)}$ and $\omega_{1(\tau=1)}$ is 272.08, $p = 0.00$). This result is consistent with the notion that stock

prices lead accounting earnings (Kothari and Sloan 1992). In other words, because the information in period t earnings is partially impounded in stock prices from period $t-2$ to $t-1$, the reaction to period t earnings will be greater for return window $t-2$ to t compared with return window $t-1$ to t. Our primary focus, however, is comparing coefficients $\omega_{2(\tau=2)}$ and $\omega_{2(\tau=1)}$ — namely, the coefficients on the interaction of institutional ownership and earnings. Note that $\omega_{2(\tau=1)}$ is 1.62, whereas $\omega_{2(\tau=2)}$ is 3.58 (Wald statistic to test the equality of $\omega_{2(\tau=2)}$ and $\omega_{2(\tau=1)}$ is 101.94, $p = 0.00$). These results are consistent with the hypothesis that institutional owners are sophisticated investors because stock prices incorporate information earlier when institutional ownership is relatively high. If institutional owners

TABLE 3
GLS estimates using a SUR specification of the relation between earnings and stock returns conditional on the percentage of institutional ownership

$$R_{it-\tau,t} = \omega_0 + \omega_{1(\tau)}E_{it} + \omega_{2(\tau)}(E_{it} \times INST_{it-\tau}) + \omega_{3(\tau)}(E_{it} \times MGR_{it-\tau}) + \omega_{4(\tau)}(E_{it} \times NANAL_{it-\tau}) + \omega_{5(\tau)}(E_{it} \times MB_{it-\tau}) + \omega_{6(\tau)}(E_{it} \times LEV_{it-\tau}) + \omega_{7(\tau)}(E_{it} \times EVAR_{it-\tau}) + \omega_{8(\tau)}E_{it-1} + \omega_{9(\tau)}(E_{it} \times SIZE_{it-\tau}) + \varepsilon_{it(\tau)}$$

	Predicted sign	Dependent variable		Wald statistic [p-value]	Dependent variable		Wald statistic [p-value]
		$R_{t-1,t}$	$R_{t-2,t}$		$R_{t-1,t}$	$R_{t-2,t}$	
Intercept	?	0.22	0.14		0.20	0.12	
		(29.65)	(14.99)		(25.80)	(13.54)	
E_{it}	+	0.80	2.10	272.08	0.62	0.48	0.45
		(11.02)	(41.94)	[0.00]	(3.67)	(3.02)	[0.50]
$E_{it} \times INST_{it-\tau}$	+	1.62	3.58	101.94	1.31	4.17	108.10
		(8.17)	(38.47)	[0.00]	(4.67)	(31.89)	[0.00]
$E_{it} \times MGR_{it-\tau}$	+				0.68	2.18	
					(3.12)	(14.53)	
$E_{it} \times NANAL_{it-\tau}$	+				−0.05	−0.17	
					(−3.95)	(−20.35)	
$E_{it} \times MB_{it-\tau}$	+				0.00	0.00	
					(0.12)	(1.17)	
$E_{it} \times LEV_{it-\tau}$	−				−0.96	−2.39	
					(−5.31)	(−16.16)	
$E_{it} \times EVAR_{it-\tau}$	−				−0.73	−1.45	
					(−12.82)	(−25.38)	
E_{it-1}	?				−0.29	−0.01	
					(−22.04)	(−0.33)	
$E_{it} \times SIZE_{it-\tau}$	+				0.22	0.56	
					(4.01)	(14.76)	
n		9,840	9,840		9,840	9,840	
SUR adjusted R^2		22.01%			24.02%		

(The table is continued on the next page.)

TABLE 3 (Continued)

Notes:

Parentheses denote *t*-statistics. The Wald statistics relate to comparing coefficients under the two return horizons.

$R_{t-1,\,t}(R_{t-2,\,t})$ = stock return measured over the period $t-1$ ($t-2$) to t;

INST = percentage of equity shares held by institutional investors;

MGR = percentage of shares held by inside owners — that is, individuals (officers, directors, and principal owners) who can exercise significant influence over corporate affairs;

SIZE = natural logarithm of market value of equity;

LEV = ratio of total debt scaled by lagged total assets;

EVAR = standard deviation of annual earnings divided by lagged market value of equity;

NANAL = number of analysts following the firm;

MB = market-to-book ratio; and

E = income before extraordinary items scaled by lagged total assets.

were more focused on current earnings, compared with other investors, opposite results would obtain. Our inferences are unaltered when we control for the variables discussed earlier. As in the previous analysis, the coefficient on the interaction term between institutional ownership and earnings increases when the stock return window increases (i.e., $\omega_{2(\tau=2)} = 4.17 > \omega_{2(\tau=1)} = 1.31$, Wald statistic = 108.10, $p = 0.00$). The coefficients on the control variables are generally statistically significant with the predicted sign, with the exception of the number of analysts variable.

Although the variable number of analysts (*NANAL*) is not a central focus of our study, the negative coefficient on $E \times NANAL$ is puzzling because we expected that firms with more analysts (and, therefore, better information intermediaries) would have more accelerated pricing of future earnings news. To explore the result further, we performed a number of sensitivity checks.[9] The distribution of *NANAL* is positively skewed (skewness = 1.72), suggesting that extreme observations may be driving this result. Hence, we use ranks of *NANAL* in estimating the equation in Table 3, but find that the rank variable continues to have a negative coefficient. We also drop the size interaction in estimating the equation because size is correlated with *NANAL*. However, the coefficient remains negative. Finally, to address the possibility that *NANAL* is a proxy for size and is picking up a concave size effect, we include an earnings-size squared interaction as an additional control variable. We still observe that the coefficient on $E \times NANAL$ is negative but, importantly, not significantly different from zero.

In addition to the interaction analysis reported above, we test the prediction that the ratio of $\omega_{1(\tau=2)}$ to $\omega_{1(\tau=1)}$ increases across quintiles of institutional own-

ership. To conduct this test, we modify (1) as follows. We drop the earnings variable and the earnings-institution interaction term from the regression.[10] Instead, we allow the coefficient on earnings to vary as a function of the quintile membership of institutional ownership. As before, we account for control variables described above and estimate the regression across quintiles as a seemingly unrelated regression. Results of estimating the modified version of (1) across quintiles are reported in Table 4. As expected, we find that the coefficient on earnings increases with the length of the measurement interval in which returns are measured — that is, $\omega_{1(\tau = 2)} > \omega_{1(\tau = 1)}$ across all quintiles. More importantly, we find that the ratio for institutional ownership in quintile 5 (2.42) is higher than the ratio in quintile 1 (1.24). To evaluate the statistical significance of the difference of these ratios, we conduct a simulation analysis as in Jacobson and Aaker 1993. Essentially, we generate 1,000 normal observations with the mean and variance characteristics reported in Table 4 for $\omega_{1(\tau = 2)}$ and $\omega_{1(\tau = 1)}$. Using these simulated observations of $\omega_{1(\tau = 2)}$ and $\omega_{1(\tau = 1)}$, we obtain 1,000 ratios of the coefficients for the highest and lowest institutional ownership quintile. We find (results not reported) that the mean ratio of the simulated coefficients for the high institutional ownership quintile is greater than the mean ratio of the simulated coefficients for the low institutional ownership quintile at the 0.00 level (two-tailed test).[11]

Analysis of order backlog

Next we estimate (3) to examine the relation between order backlog information and stock returns, conditional on institutional ownership. Table 5 presents results of estimating (3). The drop in sample size from 9,840 to 3,500 firm-years is due to the absence of order backlog information for the excluded firms. To maintain consistency with (1) and (2), we augment (3) by the determinants of the returns-earnings regression discussed above as control variables. As expected, the pricing of order backlog information increases with the level of institutional ownership. The coefficient on the interaction of order backlog and percentage institutional ownership is 0.02 and statistically significant at the 0.01 level. These results provide additional support for the idea that prices of firms with higher levels of institutional ownership incorporate more information about future earnings. The coefficients on all control variables are significant and generally have the same signs as observed in Tables 2 and 3.[12]

Robustness check

A competing explanation for the findings related to estimation of (2) is that the amount of forward-looking, nonearnings information varies with institutional ownership. Although the order backlog test described above mitigates this concern, it does not address the possibility that the extent of nonfinancial information other than order backlog may be correlated with the extent of institutional ownership. To ensure that the extent of forward-looking information is not a correlated omitted variable in the specification and to conduct related robustness checks, we augment the control variables introduced in (2) in three ways. First, we include the extent of research and development (*R&D*) scaled by lagged market value as an additional

TABLE 4
GLS estimates using SUR specification of the relation between earnings and stock returns conditional on the quintile membership of the percentage of institutional ownership

$$R_{it-\tau,\,t} = \omega_0 + \omega_{1(\tau),\,1}(E_{it} \times Quintile1) + \omega_{1(\tau),\,2}(E_{it} \times Quintile2) + \omega_{1(\tau),\,3}(E_{it} \times Quintile3) + \omega_{1(\tau),\,4}(E_{it} \times Quintile4) + \omega_{1(\tau),\,5}(E_{it} \times Quintile5) + \omega_{3(\tau)}(E_{it} \times MGR_{it-\tau}) + \omega_{4(\tau)}(E_{it} \times NANAL_{it-\tau}) + \omega_{5(\tau)}(E_{it} \times MB_{it-\tau}) + \omega_{6(\tau)}(E_{it} \times LEV_{it-\tau}) + \omega_{7(\tau)}(E_{it} \times EVAR_{it-\tau}) + \omega_{8(\tau)}E_{it-1} + \omega_{9(\tau)}(E_{it} \times SIZE_{it-\tau}) + \varepsilon_{it(\tau)}$$

	Predicted sign	Dependent variable		
		$R_{t-1,\,t}$	$R_{t-2,\,t}$	Ratio $(\omega_{1(\tau=2)}/\omega_{1(\tau=1)})$
Intercept	?	0.20	0.12	
		(25.48)	(13.37)	
$E_{it} \times Quintile1$	+	0.66	0.82	1.24
		(3.80)	(4.95)	
$E_{it} \times Quintile2$	+	0.97	1.33	1.37
		(4.85)	(7.81)	
$E_{it} \times Quintile3$	+	1.32	2.12	1.61
		(5.67)	(11.43)	
$E_{it} \times Quintile4$	+	1.76	3.21	1.77
		(6.70)	(15.46)	
$E_{it} \times Quintile5$	+	1.39	3.37	2.42
		(5.08)	(17.00)	
$E_{it} \times MGR_{it-\tau}$	+	0.76	2.25	
		(3.44)	(14.92)	
$E_{it} \times NANAL_{it-\tau}$	+	−0.05	−0.17	
		(−3.74)	(−20.19)	
$E_{it} \times MB_{it-\tau}$	+	0.00	0.00	
		(0.12)	(1.08)	
$E_{it} \times LEV_{it-\tau}$	−	−0.98	−2.39	
		(−5.36)	(−15.99)	
$E_{it} \times EVAR_{it-\tau}$	−	−0.72	−1.43	
		(−12.27)	(−24.64)	
E_{it-1}	?	−0.29	−0.02	
		(−21.83)	(−0.43)	
$E_{it} \times SIZE_{it-\tau}$	+	0.20	0.55	
		(3.66)	(14.09)	
n		9,840	9,840	
SUR adjusted R^2		24.16%		

(The table is continued on the next page.)

TABLE 4 (Continued)

Notes:

Parentheses denote *t*-statistics. The Wald statistics relate to comparing coefficients under the two return horizons. *Quintile*1 through *Quintile*5 assume a value of 1 to indicate membership in a particular quintile of institutional ownership and 0 otherwise.

$R_{t-1,\,t}$ ($R_{t-2,\,t}$) = stock return measured over the period $t-1$ ($t-2$) to t;

MGR = percentage of shares held by inside owners — that is, individuals (officers, directors, and principal owners) who can exercise significant influence over corporate affairs;

SIZE = natural logarithm of market value of equity;

LEV = ratio of total debt scaled by lagged total assets;

EVAR = standard deviation of annual earnings divided by lagged market value of equity;

NANAL = number of analysts following the firm;

MB = market-to-book ratio; and

E = income before extraordinary items scaled by lagged total assets.

regressor. Firms with higher levels of *R&D* are expected to have higher levels of nonearnings information useful in pricing stocks. Second, we interact *INST* with $R\&D \times E$, $MB \times E$, and $EVAR \times E$ (all scaled by lagged market value of equity) to test whether, among high-intangible and/or volatile-earnings firms, institutional ownership has an incremental impact on the degree to which returns lead earnings. Third, we interact *INST* with $E_{t-1}(E_{t-2})$ to test whether institutional ownership also influences the degree to which earnings information is reflected in future returns. (Note that this is the opposite perspective from our primary tests, which examine the extent to which current returns reflect future earnings.)

The results of estimating the described regression specification are presented in Table 6. Imposition of the requirement of nonzero observations for the *R&D* variable reduces the number of usable observations in the test to 4,910 firm-years. It is interesting to note that the coefficient on earnings for stock returns estimated over the short window ($\tau = 1$) is not statistically different from the coefficient on earnings over the longer window ($\tau = 2$). The introduction of the control variables that account for the lead-lag relation in prices and earnings (such as *R&D*) possibly renders the earnings-response coefficients statistically insignificant.[13] Furthermore, we find that among high-intangible firms (proxied by firms with high market-to-book ratios), the positive impact of institutional ownership on the degree to which returns lead earnings is increased (Wald statistic = 9.56, $p = 0.00$). However, among firms with highly volatile earnings, the positive impact of institutional ownership is reduced (Wald statistic = 52.03, $p = 0.00$). This latter result suggests that institutional owners have difficulty pricing the implications of current information for future earnings when earnings volatility is high.

However, our primary focus is on the interaction of institutional ownership and earnings. Note that $\omega_{2(\tau=1)}$ is 1.84 and is smaller than $\omega_{2(\tau=2)}$, which is 6.24 (Wald statistic = 45.86, $p = 0.00$). An appropriate evaluation of the effect of the interaction of institutional ownership and earnings on returns is more involved than a simple comparison of these two coefficients. The marginal change in returns (R) given a marginal change in the interaction between E and $INST$ is:

$$\delta R/\delta(E \times INST) = \omega_2 + \omega_{11} \times R\&D + \omega_{12} \times MB + \omega_{13} \times EVAR \quad (4).$$

TABLE 5
GLS regression results of the relation between earnings, order backlog, and stock returns conditional on the percentage of institutional ownership

$$R_{it-1,t} = \gamma_0 + \gamma_1 E_{it} + \gamma_2 BACKLOG_{it} + \gamma_3(BACKLOG_{it} \times INST_{it-1}) + \gamma_4(E_{it} \times INST_{it-1}) + \gamma_5(E_{it} \times MGR_{it-1}) + \gamma_6(E_{it} \times NANAL_{it-1}) + \gamma_7(E_{it} \times MB_{it-1}) + \gamma_8(E_{it} \times LEV_{it-1}) + \gamma_9(E_{it} \times EVAR_{it-1}) + \gamma_{10}E_{it-1} + \gamma_{11}(E_{it} \times SIZE_{it-1}) + \upsilon_{it}$$

	Predicted sign	Coefficient estimate
Intercept	+	0.11 (10.95)
E_{it}	+	0.36 (2.17)
$BACKLOG_{it}$	+	0.00 (0.14)
$BACKLOG_{it} \times INST_{it-1}$	+	0.02 (3.47)
$E_{it} \times INST_{it-1}$	+	1.57 (4.02)
$E_{it} \times MGR_{it-1}$	+	0.69 (2.91)
$E_{it} \times NANAL_{it-1}$	+	−0.05 (−2.73)
$E_{it} \times MB_{it-1}$	+	0.04 (2.81)
$E_{it} \times LEV_{it-1}$	−	0.17 (0.80)
$E_{it} \times EVAR_{it-1}$	−	−0.04 (−0.36)
E_{it-1}	?	−0.58 (−18.30)
$E_{it} \times SIZE_{it-1}$	+	0.18 (2.73)
n		3,500
Adjusted R^2		11.31%

(The table is continued on the next page.)

TABLE 5 (Continued)

Notes:

Parentheses denote *t*-statistics.

$R_{t-1,t}$ = stock return measured over the period $t-1$ ($t-2$) to t;

BACKLOG = order backlog scaled by lagged market value of equity;

INST = percentage of equity shares held by institutional investors;

MGR = percentage of shares held by inside owners — that is, individuals (officers, directors, and principal owners) who can exercise significant influence over corporate affairs;

SIZE = natural logarithm of market value of equity;

LEV = ratio of total debt scaled by lagged market value of equity;

EVAR = standard deviation of annual earnings divided by lagged total assets;

NANAL = number of analysts following the firm;

MB = market-to-book ratio; and

E = income before extraordinary items scaled by lagged total assets.

We evaluated this expression for both the one-year ($R_{t-1,t}$) and two-year windows ($R_{t-2,t}$) using first-quartile, median, and third-quartile values from the distributions of *R&D*, *MB*, and *EVAR*. The values of (4) for the one-year (two-year) return windows were as follows: first quartile, 1.44 (6.06); median, 1.20 (5.95); and third quartile, 0.71 (5.43). The larger values for the two-year window are consistent with institutional owners having a positive effect on the lead-lag relation between earnings and returns. Thus, even after the introduction of additional controls, we find evidence consistent with the hypothesis that institutional owners are sophisticated investors because stock prices incorporate information earlier when institutional ownership is relatively high.

Endogeneity

In this section, we model institution investors' preferences for stocks and consider the impact of these preferences on the lead-lag relations between prices and earnings documented above. Specifically, we treat institutional ownership as an endogenous variable using a two-stage approach. In the first stage, we model the choice of institutional ownership as a function of the factors identified by Gompers and Metrick 2001. We substitute the predicted level of institutional ownership from the first-stage into the second-stage lead-lag regressions.

Gompers and Metrick (2001) argue that institutions prefer to invest in large firms (proxied by *SIZE*), although their demand for stocks is a concave function of firm's market capitalization (proxied by *SIZE* squared). Furthermore, Gompers and Metrick show that institutions prefer to invest in (1) liquid stocks (proxied by *LIQ*, which is set to one when the firm's stock price is greater than $10 and zero otherwise), (2) firms that have lower returns in the previous year (RET_{t-1}), and (3) firms

TABLE 6
GLS estimates using SUR specification of the relation between earnings and stock returns conditional on the percentage of institutional ownership and other variables designed to test the robustness of the main results

$$R_{it-\tau,\,t} = \omega_0 + \omega_{1(\tau)}E_{it} + \omega_{2(\tau)}(E_{it} \times INST_{it-\tau}) + \omega_{3(\tau)}(E_{it} \times MGR_{it-\tau}) + \omega_{4(\tau)}(E_{it} \times NANAL_{it-\tau}) + \omega_{5(\tau)}(E_{it} \times MB_{it-\tau}) + \omega_{6(\tau)}(E_{it} \times LEV_{it-\tau}) + \omega_{7(\tau)}(E_{it} \times EVAR_{it-\tau}) + \omega_{8(\tau)}E_{it-1} + \omega_{9(\tau)}(E_{it} \times SIZE_{it-\tau}) + \omega_{10(\tau)}(E_{it} \times R\&D_{it-\tau}) + \omega_{11(\tau)}(E_{it} \times INST_{it-\tau} \times R\&D_{it-\tau}) + \omega_{12(\tau)}(E_{it} \times INST_{it-\tau} \times MB_{it-\tau}) + \omega_{13(\tau)}(E_{it} \times INST_{it-\tau} \times EVAR_{it-\tau}) + \omega_{14(\tau)}(E_{it} \times INST_{it-\tau}) + \varepsilon_{it(\tau)}$$

	Predicted sign	Dependent variable		Wald statistic [p-value]
		$R_{t-1,\,t}$	$R_{t-2,\,t}$	
Intercept	?	0.25	0.16	
		(20.44)	(10.62)	
E_{it}	+	−0.08	−0.12	0.01
		(−0.26)	(−0.44)	[0.92]
$E_{it} \times INST_{it-\tau}$	+	1.84	6.24	45.86
		(2.80)	(16.90)	[0.00]
$E_{it} \times MGR_{it-\tau}$	+	1.15	2.94	
		(3.42)	(12.90)	
$E_{it} \times NANAL_{it-\tau}$	+	−0.05	−0.18	
		(−2.21)	(−11.56)	
$E_{it} \times MB_{it-\tau}$	+	0.06	−0.09	
		(1.10)	(−4.66)	
$E_{it} \times LEV_{it-\tau}$	−	−0.15	−2.69	
		(−0.36)	(−10.29)	
$E_{it} \times EVAR_{it-\tau}$	−	0.20	1.86	
		(0.49)	(8.75)	
E_{it-1}	?	−0.73	−0.35	
		(−10.90)	(−3.13)	
$E_{it} \times SIZE_{it-\tau}$	+	0.27	0.56	
		(2.93)	(8.94)	
$E_{it} \times R\&D_{it-\tau}$	+	−0.00	−0.00	
		(−0.21)	(−0.12)	
$E_{it} \times INST_{it-\tau} \times R\&D_{it-\tau}$	?	0.00	−0.00	0.00
		(0.09)	(−0.04)	[0.95]
$E_{it} \times INST_{it-\tau} \times MB_{it-\tau}$	?	−0.23	0.24	9.56
		(−1.28)	(5.07)	[0.00]
$E_{it} \times INST_{it-\tau} \times EVAR_{it-\tau}$	?	−3.66	−16.10	52.03
		(−2.09)	(−17.79)	[0.00]
$E_{it-1} \times INST_{it-\tau}$	?	0.77	0.66	
		(3.21)	(2.28)	
n		4,910	4,910	
SUR adjusted R^2		23.97%		

(The table is continued on the next page.)

TABLE 6 (Continued)

Notes:

Parentheses denote *t*-statistics. The Wald statistics relate to comparing coefficients under the two return horizons.

$R_{t-1,\,t}$ ($R_{t-2,\,t}$) = stock return measured over the period $t-1$ ($t-2$) to t; and

R&D = research and development expenditure scaled by lagged market value of equity.

See the notes to Table 5 for the definition of the other variables.

with higher market-to-book ratios (proxied by *MB*). Consistent with O'Brien and Bhushan 1990, we argue that institutions invest in firms that are well followed by analysts (proxied by *NANAL*). Thus, our first-stage regression equation, which explains the choice of institutional ownership, is as follows:

$$INST_{it-\tau} = \delta_0 + \delta_1 SIZE_{it-\tau} + \delta_2 SIZE^{\,2}{}_{it-\tau} + \delta_3 NANAL_{it-\tau} + \delta_4 MB_{it-\tau} + \delta_5 LIQ_{it-\tau} + \delta_6 RET_{it-\tau-1} + \upsilon_{it-\tau} \quad (5).$$

In the above specification, *INST* is measured at the beginning of the return accumulation period of our lead-lag tests. Note that the equation explaining institutional ownership choice does not include future returns ($R_{t-\tau,\,t}$) (i.e., the dependent variable in (6), below, is not an independent variable in (5)). Hence, we conduct a recursive estimation as opposed to a simultaneous estimation.[14] However, the need for such a consecutive time-series of three years of returns for the same firm reduces the total number of observations in the endogeneity tests to 6,928 firm-years from the original sample size of 9,840 firm-years.[15]

We obtain a predicted value of *INST* (called *INSTHAT*) from (5) and insert that value in our lead-lag regressions represented by (6):

$$\begin{aligned} R_{it-\tau,\,t} = {} & \omega_0 + \omega_{1(\tau)} E_{it} + \omega_{2(\tau)}(E_{it} \times INSTHAT_{it-\tau}) + \omega_{3(\tau)}(E_{it} \times MGR_{it-\tau}) \\ & + \omega_{4(\tau)}(E_{it} \times NANAL_{it-\tau}) + \omega_{5(\tau)}(E_{it} \times MB_{it-\tau}) \\ & + \omega_{6(\tau)}(E_{it} \times LEV_{it-\tau}) + \omega_{7(\tau)}(E_{it} \times EVAR_{it-\tau}) + \omega_{8(\tau)} E_{it-1} \\ & + \omega_{9(\tau)}(E_{it} \times SIZE_{it-\tau}) + \varepsilon_{it(\tau)} \end{aligned} \quad (6).$$

The results of the estimation procedure are reported in Table 7. We find that our inferences from both lead-lag regressions, after allowing for the endogeneity of institutional ownership, are similar to those reported in the main body of the paper.[16] In untabulated analyses, we conducted a similar procedure for the lead-lag relations decomposed by quintiles of predicted institutional ownership (*INSTHAT*) and found qualitatively similar inferences.

Endogeneity-based tests reported above are subject to three caveats. First, only *INST* is treated as endogenous. Other firm-specific variables are assumed to be exogenous or predetermined variables. Obviously, identification considerations

require each endogenous variable to be associated with some unique set of exogenous variables (or instruments). We acknowledge that some of the instrumental variables (e.g., *NANAL*) are themselves likely to be endogenous and we would need to specify a separate equation to explain the choice of each endogenous variable. However, this process would involve the difficult task of finding an exogenous variable for each such equation. We leave it to future research to pursue this task and

TABLE 7
GLS estimates using SUR specification of the relation between earnings and stock returns conditional on the percentage of institutional ownership after accounting for the endogenous determination of institutional ownership

$$INST_{it} = \delta_0 + \delta_1 SIZE_{it} + \delta_2 SIZE^2{}_{it} + \delta_3 NANAL_{it} + \delta_4 MB_{it} + \delta_5 LIQ_{it} + \delta_6 R_{it-1} + \upsilon_{it(\tau)}$$

$$\begin{aligned} R_{it-\tau,\,t} = {} & \omega_0 + \omega_{1(\tau)} E_{it} + \omega_{2(\tau)}(E_{it} \times INSTHAT_{it-\tau}) + \omega_{3(\tau)}(E_{it} \times MGR_{it-\tau}) \\ & + \omega_{4(\tau)}(E_{it} \times NANAL_{it-\tau}) + \omega_{5(\tau)}(E_{it} \times MB_{it-\tau}) + \omega_{6(\tau)}(E_{it} \times LEV_{it-\tau}) \\ & + \omega_{7(\tau)}(E_{it} \times EVAR_{it-\tau}) + \omega_{8(\tau)} E_{it-1} + \omega_{9(\tau)}(E_{it} \times SIZE_{it-\tau}) + \varepsilon_{it(\tau)} \end{aligned}$$

Stage 1			Stage 2				
	Predicted sign	Coefficient estimate		Predicted sign	Dependent variable $R_{t-1,\,t}$	Dependent variable $R_{t-2,\,t}$	Wald statistic [p-value]
Intercept	?	−0.15 (−11.78)	Intercept	?	0.22 (23.64)	0.17 (14.59)	
$SIZE_{it}$	+	0.14 (28.33)	E_{it}	+	0.83 (3.89)	0.73 (3.87)	0.15 [0.70]
$SIZE^2{}_{it}$	−	−0.01 (−18.32)	$E_{it} \times INSTHAT_{it-\tau}$	+	1.15 (2.37)	4.13 (12.77)	33.65 [0.00]
$NANAL_{it}$	+	0.01 (13.64)	$E_{it} \times MGR_{it-\tau}$	+	0.90 (3.27)	2.09 (11.59)	
MB_{it}	+	0.00 (1.09)	$E_{it} \times NANAL_{it-\tau}$	+	−0.05 (−3.22)	−0.18 (−18.75)	
LIQ_{it}	+	0.04 (9.68)	$E_{it} \times MB_{it-\tau}$	+	−0.00 (−0.02)	0.01 (1.59)	
R_{it-1}	−	−0.00 (−3.57)	$E_{it} \times LEV_{it-\tau}$	−	−0.97 (−4.18)	−2.57 (−14.87)	
			$E_{it} \times EVAR_{it-\tau}$	−	−1.39 (−19.13)	−3.46 (−35.35)	
			E_{it-1}	?	−0.25 (−14.21)	0.09 (2.07)	
			$E_{it} \times SIZE_{it-\tau}$	+	0.18 (2.31)	0.60 (12.67)	
n		6,928	n		6,928	6,928	
SUR adjusted R^2		65.68%	SUR adjusted R^2		24.79%		

(The table is continued on the next page.)

TABLE 7 (Continued)

Notes:

Parentheses denote *t*-statistics. The Wald statistics relate to comparing coefficients under the two return horizons.

$R_{t-1,t}$ ($R_{t-2,t}$) = stock return measured over the period $t-1$ ($t-2$) to t;

INST = percentage of equity shares held by institutional investors;

MGR = percentage of shares held by inside owners — that is, individuals (officers, directors, and principal owners) who can exercise significant influence over corporate affairs;

SIZE = natural logarithm of market value of equity;

$SIZE^2$ = squared term of *SIZE*;

LEV = ratio of total debt scaled by lagged total assets;

EVAR = standard deviation of annual earnings divided by lagged total assets;

NANAL = number of analysts following the firm;

MB = market-to-book ratio;

E = income before extraordinary items scaled by lagged market value of equity;

LIQ = a proxy for liquidity represented by 1 for firms whose stock price is greater than 10 and 0 otherwise; and

R_{it-1} = annual stock return measured over the fiscal year prior to *t*.

note a caveat by Ittner and Larcker 2001 that it is hard to identify exogenous instruments that apply to one organizational choice and not to the other, because many of the organizational choices are interrelated.

Second, our variables are likely to be measured with error resulting in inconsistent estimates for the structural equation parameters and their standard errors. However, without greater knowledge of the correlation structure of the measurement error, it is difficult to precisely estimate the impact of these errors on our inferences. Third, it is quite likely that the system of equations is misspecified because of correlated omitted variables and inappropriate zero restrictions on the coefficients between the exogenous instruments and the endogenous variables. For example, the extent of *INST* is possibly chosen in response to factors other than those considered in (4). To the extent that our analyses do not consider all the determinants of institutional ownership, we face the possibility that our results are affected by unidentified, omitted variables.

6. Conclusions

In this paper, we test two competing views of institutional owners. One view is that institutional owners are overly focused on current financial performance. If this is the case, compared with other investors, institutions are less likely to consider factors

that affect future-period earnings in pricing securities. An opposing view is that institutional owners are sophisticated investors with better information-processing capabilities and hence, stock prices of firms with higher institutional ownership will tend to reflect a relatively greater proportion of the information in *future*-period earnings. We find results consistent with the latter view. Specifically, we find that for firms with higher levels of institutional ownership, relatively more future earnings information is impounded in stock prices in comparison to firms with lower institutional ownership. Studies of firm valuation and contracting suggest a number of factors that need to be controlled when examining earnings-return relationships. Controlling for these factors, however, does not change the inferences with respect to institutional ownership in our study.

A regression of returns on order backlog, conditional on institutional ownership, indicates that institutional investors place more weight on order backlog compared with other investors. Because order backlog is related to future earnings, this analysis provides additional support for the contention that institutional owners are sophisticated investors. Recent work by Bartov et al. 2000, which suggests that inefficient pricing of earnings is reduced when institutional ownership is high, also supports this view.

Our results, however, do not imply that *all* institutional owners are sophisticated investors and are more likely to consider future earnings in pricing securities. Indeed, research by Bushee 1998 suggests that a subcategory of institutional investors (specifically those with high portfolio turnover and diversification and who follow a momentum trading strategy) may excessively focus on current-period earnings. However, our research contributes to the debate regarding institutional ownership by demonstrating that, *on average*, stock prices are more likely to reflect future earnings when institutional ownership is high, which is consistent with institutional investors possessing information-acquisition and information-processing advantages. A limitation of our paper is that we do not examine trading patterns of institutional investors. Thus, we do not offer direct evidence on the mechanism by which institutional investors affect the pricing of information that is reflected in future earnings. It is hoped that future research will address this limitation and provide additional insight into the role that sophisticated investors play in the setting of security prices.

Endnotes

1. We control for managerial ownership and assume that the only major investor category other than institutional investors and managers is individuals. A similar assumption is made in Bushee 1998 and in Lang and McNichols 1997.
2. Our study was developed independently of the work by Bartov et al. 2000.
3. This assumption is problematic for institutions that follow passive indexing strategies. This subset of institutional investors will bias our results toward the null hypothesis.
4. This approach has also been used by Jacobson and Aaker 1993 to demonstrate that stock prices in Japan reflect a greater proportion of the information on future as opposed to current earnings. Here, we use the approach to analyze whether, within the United States, the proportion of information on future versus current earnings is related to institutional ownership.

5. The SUR approach allows us to exploit correlations between error terms in the two regressions where returns over $\tau = 1$ (one-year returns) and returns over $\tau = 2$ (two-year returns) are the dependent variables. Furthermore, estimation of the two regressions as a system enables us to legitimately compare $\omega_{2(\tau = 2)}$ with $\omega_{2(\tau = 1)}$. If $\omega_{2(\tau = 2)}$ with $\omega_{2(\tau = 1)}$ were derived from a set of two equations that were not estimated as a system, it might be econometrically inappropriate to compare them and draw inferences from the comparison.
6. We focus on order backlogs because they are easily available in machine-readable format. The test could potentially be extended to cover other nonfinancial measures such as patent grants. Unfortunately, we are not aware of a similar, machine-readable data source for patent grants. Furthermore, patents represent fairly complex, nonfinancial information. Lev (2000, 87) points out that a few patents generate substantial returns while the majority of patents are worthless. Patent citations in subsequent patent applications have been shown to be a more reliable measure of the patent's value than patent counts (see Deng, Lev, and Narin 1999). Austin (1993) reports that patents identifiable with end products tend to be more highly valued by investors than an average patent. Hence, we suspect that transforming the patent grant into a measure with clear implications for future earnings would be a nontrivial task. However, greater order backlog in dollar terms generally suggests good news for a firm's future earnings.
7. This procedure is consistent with the approach in a number of previous returns-earnings studies (see Collins and Kothari 1989).
8. To address the cross-correlation and serial correlation inherent in the panel data approach, we embed the SUR regression in a generalized least squares (GLS) framework (see Greene 1993). We estimate the GLS regression using the PROC MODEL procedure in SAS. An alternative approach to address cross-correlation in error terms is to use the Fama-MacBeth–based "across-year" *t*-statistics. However, Fama-MacBeth–based *t*-statistics are likely to be more reliable as the number of years in the data set become larger. Considering that we have access to only seven years of institutions data, we have opted to present the results using the GLS approach.
9. Input from a reviewer led to these analyses.
10. The earnings term must be dropped to prevent over-identification problems in the regression.
11. Table 1 shows that the distribution of stock returns is right-skewed. To check whether such skewness affects inferences, we reran our tests using a logarithmic transformation of returns (i.e., $\ln(1 + R_{it})$) as the dependent variable. The tenor of the conclusions is, however, unchanged.
12. In unreported sensitivity tests, we conducted the backlog regressions with change in order backlog instead of in the level of order backlog. Our inferences from the change specification were the same as those from the level specification.
13. By construction, the coefficient on earnings reflects the returns-earnings multiple when all the interaction variables are set to zero.
14. For example, if *INST* is measured as of December 31, 1990, *RET* in (5) refers to returns for the calendar year 1990 whereas the *R*, the returns variable in (6), considers returns for calendar year 1991 for the short window and returns for the calendar years 1991

and 1992 for the longer window. Thus, there is no overlap in the returns used in the first-stage and second-stage equations. However, for this example, we need consecutive data for 1990, 1991, and 1992 for the same firm.

15. The reduced sample size prompted us to present the endogeneity results as a part of the sensitivity tests reported in the paper as opposed to treating these tests as a main analysis in the paper.
16. These findings imply that if the exogenous determinants of institutional ownership changed so as to cause institutional ownership to increase, we should expect to observe an increase in the lead-lag relation between returns and earnings, holding the other determinants of the lead-lag relation constant (see Holthausen, Larcker, and Sloan 1995 for a similar interpretation of endogeneity-related regressions in a different research setting).

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