This paper examines the major determinants of the number of analysts following a firm. A simple model of analyst following is proposed and several firm characteristics are suggested that are likely to influence the extent of a firm's analyst following by either affecting the aggregate demand for or supply of analyst services or both for the firm. Almost all of these characteristics are found to be strongly significant in affecting the extent of analyst following of firms and the empirical results generally accord well with economic intuition.

1. Introduction

Financial analysts from several brokerage houses, independent research services, and banks produce and analyze information on a large population of firms and a number of studies have examined the earnings forecasting abilities of financial analysts. The existing evidence [e.g., Brown, Richardson, and Schwager (1987)] suggests that the superiority of financial analysts over time series models in forecasting earnings is positively related to firm size. Furthermore, studies [e.g., Atiase (1985), Freeman (1987), and Bhushan (1989)] that examine the cross-sectional variation in the information content of earnings announcements find an inverse relation between information content and firm size and researchers have linked this finding to differences in analyst following of firms. Many of these studies argue that larger firms are followed by more analysts, which results in greater private information acquisition about these firms. This leads to the relative superiority of financial analysts over time series models in forecasting earnings of such firms and also results in earnings announcements by these firms to be less informative.

*This paper is based on Chapter 5 of my dissertation completed at the University of Chicago. I am grateful to the members of my committee, Bob Holthausen, Charlie Jacklin, Shmuel Kandel, Richard Leftwich, Rob Vishny, and especially to Doug Diamond, the chairman of the committee, for all their guidance and useful comments. I would also like to thank Bhagwan Chowdhry, Paul Healy, Gur Huberman, Pat O'Brien, Katherine Schipper, an anonymous reviewer, and the editor, Ray Ball, for many valuable comments and suggestions.

The major objective of this paper is to improve our understanding of the economics underlying analyst following of firms. Viewing the number of analysts following a firm as a proxy for the total resources spent on private information acquisition about the firm, I provide a simple framework to examine how various factors influence analyst following. As noted above, firm size is frequently postulated to be one important factor that affects analyst following of firms. This paper examines whether characteristics other than size also affect the extent of analyst following of a firm. The paper thus provides evidence relevant to studies that investigate the superiority of analysts' earnings forecasts over time series model forecasts and to studies that examine cross-sectional differences in security price reactions to information events, e.g., earnings releases.

Since financial analysts collect and disseminate information about firms, the issue of analyst following is closely related to the theoretical literature on information acquisition [e.g., Grossman (1976, 1978), Grossman and Stiglitz (1976, 1980), Hellwig (1980), Diamond and Verrecchia (1981), Verrecchia (1982), Admati (1985), Admati and Pfleiderer (1986), and Bhushan (1989) amongst many others]. Rigorous theoretical modeling of analyst following of firms is difficult and is still in its infancy. Nevertheless, in section 2 I present a simple model. The purpose of the model is to generate some economic intuition about analyst following and to aid interpretation of the empirical results. The number of analysts following a firm is viewed as a proxy for the equilibrium total expenditure in the economy on analyst services for that firm. This total expenditure in turn depends on the interaction between the aggregate demand and supply of analyst services. The effect of a firm characteristic on analyst following can thus be examined in terms of its influence on the aggregate demand and supply functions for analyst services.

Next, I consider various firm characteristics that can influence either the aggregate demand or supply function and the nature of these influences. The firm characteristics I consider are the ownership structure of the firm, firm size, return variability of the firm, number of lines of business of the firm, and the correlation between the firm's return and the market return.

Section 3 of the paper describes the data used in the study. In section 4, I present the results of the empirical work. The number of financial analysts following a firm is found to be related to the firm's ownership structure, represented by the number of institutions holding its shares, the percentage of its shares held by these institutions, and the percentage of the firm's shares held by insiders. Also, the extent of analyst following is found to be positively related to firm size, the return variability of the firm, the squared correlation between firm's return and the market return and inversely related to the

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2 Admati and Pfleiderer (1986) model the financial analyst as a monopolist, and is one of the first attempts in this direction.
number of lines of business of the firm. Most of these findings agree with economic intuition. Finally, there is evidence of significant differences across industries in terms of analyst following, which suggests that there are differences either in the aggregate demand for or supply of analyst services for firms in different industries. In section 5 of the paper I present some concluding remarks and directions for future research.

2. A simple model of analyst following

Analysts produce and collect a wide variety of information to analyze the firms they follow. Their published reports on a firm include buy and sell recommendations and deal with its standing relative to the competitors, the prospects for its industry, its involvement in any current or anticipated legal battles, etc. Analysts often make short-term earnings forecasts as well as long-term growth forecasts for the firms they follow. I classify all the activities performed by analysts under the general heading ‘analyst services’ since for this paper a more detailed characterization of these services is not necessary.

In the model that I develop below, I derive implications for the effects of various firm characteristics on the total expenditure by all investors on analyst services for a firm. To test the implications of the model, I use the number of analysts following a firm as a proxy for this total expenditure. The relation between the number of analysts following a firm and the total expenditure by investors on analyst services about that firm is not likely to be perfect. For example, differences in salaries of analysts will make the relation imperfect. The underlying assumption for the empirical work to be meaningful is that this relation is linear and imperfect (provided the errors in the proxy are not correlated with the independent variables) and there is no strong reason to believe that this assumption will be seriously violated by the data.

The model developed here does not deal explicitly with the issues of ‘free-riding’ and ‘resale of analyst services’. Incorporating free-riding explicitly in the model makes it complicated and difficult to analyze. Investors can free-ride by observing the market price of a security and inferring from the security price movements at least partially the information possessed and sold by the analysts following that firm. Thus an individual investor’s demand function for analyst services is not completely exogenous, it also depends on the buying activities of other investors. The effect of free-riding is to endogenize investors’ demands for analyst services which makes it difficult to explicitly incorporate free-riding in the model.

Resale of analyst services is also a distinct possibility in such a market and occurs if, after buying analyst services, the buyer resells information to other clients. This phenomenon is also equivalent to a number of investors jointly rather than individually buying these services. Resale of analyst services would cause the net (i.e., net of reselling) aggregate demand to be lower than under
no resale. The analysis done in this paper, however, can be interpreted as implicitly accounting for both free-riding and resale by viewing aggregate demand as net of these effects or by assuming that free-rider/resale issues are not different from one firm to another.

The model does not also seriously address the issue of public disclosure of their information by some analysts. Many analysts (and the sample I use in the empirical work is likely to include such analysts) tend to publicly disclose (at least some of) their work. In the model, which is based on private costs and benefits, analysts do not have any incentive to publicly disclose their work. I do not believe this to be a serious limitation of the model because one could rather forcefully argue that the public disclosure probably comes only after the analysts or their clients have benefited from their private information. That is, once an analyst identifies a useful piece of information, he is most likely to first use it for his company or transmit it to his favored clients, then put it in a newsletter to subscribers, and finally disclose it publicly. By the time the information is made public by the analyst, much of the private gains have already been made. Hence although the issue of public disclosure by analysts deserves more attention, it is not likely to restrict the general applicability of the model.

I assume that for each firm the extent of analyst following is determined competitively. I believe it is a reasonable assumption given that there are no barriers to entry or exit for this activity. I further assume that all analysts provide services of the same quality.

The equilibrium total expenditure by investors on analyst services for any firm will be a function of various firm characteristics and its dependence on these characteristics arises through either the aggregate demand or the supply function for analyst services. Let \( k_1, k_2, \ldots, k_n \) denote the various firm characteristics that can affect either the aggregate demand or supply function. Let

\[
Q = D(P, k_1, k_2, \ldots, k_n) \quad (1)
\]

and

\[
Q = S(P, k_1, k_2, \ldots, k_n) \quad (2)
\]

represent the aggregate demand and supply functions, respectively. In eqs. (1) and (2) \( P \) represents the price per unit of analyst services. For simplicity, I assume that both the aggregate demand and supply functions are continuous and twice differentiable in all their arguments. I also make the usual assumptions that the demand curve is downward sloping and the supply curve is upward sloping, i.e., \( \partial D/\partial P < 0 \) and \( \partial S/\partial P > 0 \).

Let \( TC^* \) denote the equilibrium total expenditure by investors on analyst services for a particular firm in a given period and let \( Q^* \) denote the
corresponding equilibrium aggregate demand for analyst services for the firm during this period. Then \( TC^* = P^*Q^* \), where \( P^* \) is the equilibrium price. Asterisks over quantities denote equilibrium values. Thus,

\[
TC^*(k_1, k_2, \ldots, k_n) = P^*(k_1, k_2, \ldots, k_n)Q^*(k_1, k_2, \ldots, k_n).
\]

(3)

To analyze the effect of any firm characteristic \( k_i \) on the equilibrium total expenditure on analyst services \( TC^* \), comparative statics on eq. (3) are examined. As shown in the appendix, the comparative statics on eq. (3) yields

\[
\frac{\partial TC^*}{\partial k_i} = \frac{Q^*((1 + \epsilon_S)(\partial D/\partial k_i) - (1 + \epsilon_D)(\partial S/\partial k_i))}{(\partial S/\partial P - \partial D/\partial P)},
\]

(4)

where \( \epsilon_D \) and \( \epsilon_S \) are the respective price elasticities of aggregate demand and supply, and these elasticities and all the derivatives are evaluated at \( Q^* \). Eq. (4) is a standard result in price theory. A change in firm characteristic \( k_i \) can result in either a shift in the demand curve or in the supply curve or both. The terms involving \( \partial D/\partial k_i \) and \( \partial S/\partial k_i \) on the right-hand side of eq. (4), respectively, measure the effects on equilibrium total expenditure of shifts in the demand and supply curves. Since \( \partial S/\partial P > 0 \) and \( \partial D/\partial P < 0 \), \( (\partial S/\partial P - \partial D/\partial P) > 0 \). Also, \( \partial S/\partial P > 0 \) implies that \( \epsilon_S > 0 \). Therefore, from eq. (4), the sign of \( \partial TC^*/\partial k_i \) is the same as that of \( \partial D/\partial k_i \), i.e., if an increase in the characteristic \( k_i \) leads to an increase in the aggregate demand without affecting the supply function, then equilibrium total expenditure must also increase with \( k_i \). Eq. (4) also implies that the sign of \( \partial TC^*/\partial k_i \) will be the same as that of \( \partial S/\partial k_i \) if the aggregate demand is elastic, i.e., \( \epsilon_D < -1 \) and the sign of \( \partial TC^*/\partial k_i \) will be opposite to that of \( \partial S/\partial k_i \) if aggregate demand is inelastic (\( \epsilon_D > -1 \)). Thus, with elastic demand, an increase in the aggregate supply resulting from an increase in \( k_i \) leads to a smaller percent decline in the equilibrium price and hence an increase in the equilibrium total expenditure.

Eq. (4) implies that whether or not the aggregate demand is elastic affects the relation between \( \partial TC^*/\partial k_i \) and \( \partial S/\partial k_i \). My intuition suggests that the aggregate demand for analyst services is likely to be elastic given that the demand for securities is highly elastic. Ceteris paribus, if the price of analyst services on a particular firm increases slightly, then investors can change their investment portfolios replacing that security with other close substitutes that have less expensive analyst services. This would result in the demand for analyst services for this firm to decline considerably, implying that the demand for analyst services may be highly elastic. The analysis that follows assumes that the aggregate demand is elastic.
What are the various firm characteristics that can influence the aggregate demand or supply functions? I consider a number of potential candidates and discuss their influence on aggregate demand and supply.\(^3\)

2.1. Ownership structure

The ownership structure of a firm is likely to affect both the aggregate demand and supply of analyst services. The following three variables that are related to the ownership structure of a firm are considered: the number of institutions holding a firm’s shares, the percentage of its shares held by these institutions, and the degree to which the firm is closely held by insiders. Although the number of institutions holding a firm’s shares and the percentage of shares held by them are both likely to affect the aggregate demand and supply of analyst services, the directions of their effects are not obvious. An increase in either of these variables suggests an increase in the concentration of ownership. If the acquisition of analyst services is not cost-effective for a small investor, more concentration of ownership would imply increased demand for analyst services. Alternatively, if institutions use in-house analysis, then aggregate demand (for outside analysts) may decrease with each of these variables.

These variables are also likely to affect the aggregate supply of analysts. One function of analysts (especially brokerage house analysts) is to generate transactions business. If institutions provide the majority of transactions business to analysts, then analyst supply is likely to increase as the number of institutions holding a firm’s shares increases.\(^4\) However, it is also conceivable that the majority of transactions business comes from small investors. Then more dispersed holdings (i.e., lower values of number of institutions or the percentage of shares held by them) will correspond to greater supply. Thus, the effects of these variables on either the aggregate demand or supply is ambiguous and it is an empirical issue to examine the relation between analyst coverage and the interest of institutions in a firm.

An increase in the percentage of shares held by insiders corresponds to lower holdings by noninsiders. Assuming that the demand for analyst services comes mainly from noninsiders, an increase in the percentage of shares held by insiders will then, ceteris paribus, result in a decline in aggregate demand for analyst services. This would lead to a negative relation between analyst coverage and insider holdings. It is also possible that an increase in insider

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\(^3\)Richardson (1984) and Damodaran (1985) also consider some of these variables in slightly different contexts.

\(^4\)Ceteris paribus, an increase in transactions business should result in an outward shift (or an increase) in aggregate supply. This can be rationalized by observing that more transactions business (and hence more commission revenue) implies an implicit decrease in cost of providing the analyst services.
holdings may increase the cost of providing analyst services and result in an inward shift in aggregate supply. For example, if increased insider holdings are associated with increased secrecy, then cost of information acquisition and hence the cost of providing analyst services may increase with the percentage of shares held by insiders. Then for elastic demand, this positive relation between cost and insider holdings will reinforce the negative relation between insider holdings and equilibrium total expenditures resulting from the aggregate demand effect.

2.2. Firm size

Ceteris paribus, the aggregate demand for analyst services is likely to be an increasing function of firm size. An investor is likely to find a piece of private information about a larger firm more valuable than the same piece of information about a smaller firm. This is because the profits that the investor can generate by trading in a larger firm on the basis of this information are likely to be higher than those in a smaller firm. A $100,000 trade in a firm with a market value of $1 billion is more likely to pass as a liquidity trade and not arouse suspicion than the same trade in a firm with a market value of only $1 million. Thus, the benefits from information acquisition are likely to be an increasing function of firm size, which implies that for larger firms, the aggregate demand for analyst services would be higher. This leads to a positive relation between total equilibrium expenditure on information acquisition and firm size.5

Firm size is also likely to influence the aggregate supply of analyst services. As suggested earlier, analysts are also in the business of generating transactions business for their companies. Analysts have incentives to focus on larger firms because they are more widely held and stimulate the interest of a large number of investors with more potential transactions business. An increase in firm size leads to more transactions business for the analysts, which implicitly lowers the cost of providing analyst services and thus shifts the aggregate supply outward. Firm size can also affect the cost of providing analyst services through its direct influence on the cost of information acquisition. It is not clear whether this cost should increase or decrease with firm size. Larger firms tend to be more dispersed geographically and have more complex structures and operations, which is likely to increase cost of information acquisition. Larger firms, on average, release more public information compared to smaller

5One can argue that the benefit from information acquisition is more likely to be related to the trading volume in a firm than firm size. I do not use trading volume as one of the explanatory variables mainly because trading volume cannot be treated as an exogenous variable like the other characteristics considered. In the relation between trading volume and analysts following, the causality runs both ways, i.e., the number of analysts following a firm also affects the trading volume in the firm and both quantities are endogenous.
firms. More information released by a firm may make the task of analysts easier by providing them with useful needed information, but it may also be a substitute for the information that an analyst could collect readily, thereby requiring the analyst to collect additional more costly private information. Thus, it is not obvious whether cost of information acquisition increases or decrease with firm size. However, it appears that the transactions business effect should be dominant and, ceteris paribus, the aggregate supply should increase with firm size. Then, for elastic demand, the supply effect will reinforce the demand effect and total expenditure will increase with firm size.

2.3. Return variability

Another variable that is likely to affect the aggregate demand for analyst services and hence total equilibrium expenditure on analyst services is a firm’s return variability. Assume that private information is useful, i.e., it can be used to make more precise predictions of future return than the expected return conditional just on public information. Then private information is more valuable for firms with higher return variability. Ceteris paribus, as return variability increases, so does the probability of getting large deviations between the expected return conditional on both private and public information and the expected return conditional just on public information. The expected trading profit is an increasing function of this probability and it follows that the expected trading profit based on private information will be higher for a firm with higher return variability. Thus the aggregate demand for analyst services is likely to be an increasing function of a firm’s return variability. It is not obvious whether return variability affects cost of information acquisition. Assuming that this cost is not significantly higher for firms with higher return variability, the prediction is that analyst following should be an increasing function of a firm’s return variability.

2.4. Number of lines of business

A firm’s number of lines of business is likely to only affect the cost of information acquisition and will thus only affect aggregate supply and not the aggregate demand. Ceteris paribus, as this number increases, it is reasonable to conclude that the information acquisition cost goes up. For a firm with many lines of business, analysts will have to follow the various lines of business a firm is engaged in. This involves more effort and cost than following a firm with just one line of business. Thus an increase in the number of lines of business will lead to an inward shift in aggregate supply and with elastic demand, the equilibrium total expenditure will be lower for such a firm.

6See also Freeman (1987).
2.5. Correlation between firm return and market return

Just as the number of lines of business, this correlation is also likely to only affect the cost of information acquisition and will thus only affect aggregate supply. For a given level of information costs relating to macro variables, the marginal information acquisition cost for a firm will be low if the squared correlation coefficient ($R^2$, in short) between the returns on the firm and the market is high. Hence, ceteris paribus, information acquisition cost is likely to be an inverse function of the $R^2$ between firm and market returns. Therefore, an increase in the $R^2$ between firm and market returns leads to an outward shift in aggregate supply and for elastic demand an increase in the total expenditure on analyst services.

2.6. Summary and limitations

Most of the firm characteristics considered above affect both the aggregate demand and supply of analyst services. The number of analysts following a firm is a proxy for total expenditure on analyst services. If data were also available on the prices of analyst services for firms, ideally a two-equation model could be used to identify separately the effects of a firm characteristic on both the aggregate demand and supply of analyst services. Unfortunately, a limitation of this study is lack of availability of data on the prices of analyst services and only number of analysts following a firm can be used as the dependent variable. Hence, if a characteristic influences both the aggregate demand and supply, then the observed coefficient will measure their combined effects on the total expenditure on analyst services.

3. Data

Data on the number of analysts following a firm were obtained from the Nelson's Directory of Wall Street Research (1986). This publication lists the names of the analysts from several brokerage houses, independent research services, and banks, who were following the firm in 1985. The directory also lists the number of institutions that held shares in the firm in the same year as well as the percentage of shares of the firm held. For many firms, this publication also lists the percentage of a firm's shares held by insiders. The listing covers many of the firms listed on the NYSE and the AMEX. For each firm in the sample, the directory is the source of the number of analysts following it, the number of institutions holding its shares and the percentage of its shares held by them, and if listed, the percentage of its shares held.

For all firms for which the directory reports the insider holdings, the reported insider holdings are greater than or equal to 1%. Hence, it can be concluded that firms for which this number is not reported, either have negligible insider holdings (i.e., < 1%) or the number is not available.
by insiders. These variables are denoted \textit{NANAL}, \textit{NINST}, \textit{\%INST}, and \textit{\%INSID}, respectively.

The market value of the equity of a firm outstanding at the end of 1984 (\textit{Value}) is used as a proxy for the size of the firm and is obtained from the CRSP tapes by multiplying the 1984 year-end closing price by the number of outstanding shares of the firm. The reason for choosing the market value of equity over the market value of the total assets as a proxy for the size is the relative ease of availability of data on the market value of equity.

Two alternate proxies are chosen for the variability of return of a firm: (1) the variance of the total return of the firm denoted \textit{Ret.Var.} and (2) the variance of the idiosyncratic return of the firm after removing the effect of marketwide factors denoted \textit{Res.Var.} Total return \(R_{it}\) is defined as the continuously compounded return for security \(i\) on day \(t\). Idiosyncratic return \(e_{it}\) is defined as the daily residual from the OLS regression of \(R_{it}\) on \(R_{m,t}\), the continuously compounded return for the value-weighted market portfolio on day \(t\). Both variances are estimated using daily data for that year 1984.

The proxy chosen for the squared correlation coefficient between a firm’s return and the market return is the \(R^2\) of the above regression between \(R_{it}\) and \(R_{m,t}\). This variable is denoted \textit{RSQMKT}.\textsuperscript{8}

Two different proxies are chosen for the number of lines of business of a firm: (1) the number of three-digit SIC codes and (2) the number of four-digit SIC codes corresponding to the firm, both as listed in the Directory of Corporate Affiliates (1986). These proxies do not take into account the correlations among the various lines of business of a firm. For example, a firm may be in fewer lines of business which are totally uncorrelated with each other, and thus it may be costlier to acquire information about this firm than for another one which is in more lines of business which are highly correlated with each other. These proxies also do not account for differences in the fractions of a firm’s business invested in the various lines. Admittedly, both these proxies are imprecise but they appear to be better than some alternate measures considered.\textsuperscript{9} These proxies are referred to as \textit{LOB1} and \textit{LOB2} (\textit{LOB} standing for the number of lines of business), respectively.

A total of 1,417 firms had data available on all the variables except the percentage of shares held by insiders. Eight of these firms appeared to be obvious cases of typographical errors and were dropped from the sample.\textsuperscript{10} Of

\textsuperscript{8}Infrequent trading in some firms can result in the OLS estimates of \textit{Res.Var.} and \textit{RSQMKT} to be biased for such firms. Tests were also conducted by estimating these parameters using the Scholes–Williams method and the results of those tests were very similar to those reported here.

\textsuperscript{9}For example, the number of lines of business disclosed in its annual report by a firm.

\textsuperscript{10}For seven of these firms, the numbers reported for the percentage of shares held by institutions and the numbers of institutions following the firm were clearly out of line with each other. For example, for one firm the values for \textit{NINST} and \textit{\%INST} were 693 and 3, respectively, while the cross-sectional means for these variables are 92.7 and 35.0. For the eighth firm dropped, the total of \textit{\%INST} and \textit{\%INSID} exceeded 100.
Table 1
Descriptive statistics of the data used in the regressions of the number of analysts.a

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Std. dev.</th>
<th>Min. obs.</th>
<th>Max. obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NANAL</td>
<td>13.94</td>
<td>10.00</td>
<td>12.60</td>
<td>1.00</td>
<td>77.00</td>
</tr>
<tr>
<td>NINST</td>
<td>92.69</td>
<td>49.00</td>
<td>116.19</td>
<td>2.00</td>
<td>900.00</td>
</tr>
<tr>
<td>%INST</td>
<td>35.03</td>
<td>35.00</td>
<td>19.85</td>
<td>1.00</td>
<td>98.00</td>
</tr>
<tr>
<td>%INSID</td>
<td>23.29</td>
<td>19.00</td>
<td>19.33</td>
<td>1.00</td>
<td>92.00</td>
</tr>
<tr>
<td>Ret. Var. × 10^4</td>
<td>5.78</td>
<td>3.81</td>
<td>9.81</td>
<td>0.46</td>
<td>230.30</td>
</tr>
<tr>
<td>Res. Var. × 10^4</td>
<td>5.26</td>
<td>3.30</td>
<td>9.71</td>
<td>0.43</td>
<td>227.90</td>
</tr>
<tr>
<td>RSQMKT</td>
<td>0.12</td>
<td>0.08</td>
<td>0.10</td>
<td>0.00</td>
<td>0.66</td>
</tr>
<tr>
<td>LOB1</td>
<td>3.67</td>
<td>3.00</td>
<td>2.61</td>
<td>1.00</td>
<td>18.00</td>
</tr>
<tr>
<td>LOB2</td>
<td>4.19</td>
<td>3.00</td>
<td>3.13</td>
<td>1.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Value ($ mill.)</td>
<td>892.72</td>
<td>259.46</td>
<td>2790.41</td>
<td>0.82</td>
<td>75437.00</td>
</tr>
<tr>
<td>ln(Value)</td>
<td>5.55</td>
<td>5.56</td>
<td>1.61</td>
<td>-0.20</td>
<td>11.23</td>
</tr>
</tbody>
</table>

a The number of observations for each variable is 1,409 except for %INSID, for which the number of observations is 966. NANAL is the number of analysts following a firm in 1985. Value is the market value of a firm's equity at the end of 1984. NINST is the number of institutions holding shares in a firm in 1985, and %INST is the percentage of a firm's shares held by them while %INSID is the percentage of a firm's shares held by insiders. LOB1 and LOB2 are two alternate proxies for the degree of diversification of the firm. Ret. Var. and Res. Var. are the estimated variances of a firm's daily return and the daily residuals from the market model during 1984. RSQMKT is the $R^2$ from the market model regression a firm's return on the market return for 1984.

The remaining 1,409 firms, 966 also had data available on %INSID. Table 1 provides some relevant descriptive statistics on these variables. The median number of analysts following a firm is 10 and the number ranges from 1 to 77. As is evident in table 1, the distribution is skewed to the right. The median number of institutions holding shares in a firm is about 50, while the median percentage of shares held by institutions is 35. Also, for firms with data on insider holdings, the median %INSID is about 20. The firms in the sample range from $0.82 million to $75.4 billion in value of equity outstanding at the end of 1984. The median number of lines of business per firm is three.

Table 2 provides the simple correlation matrix for the explanatory variables. The simple correlation coefficient between ln(Value) and NINST is 0.77, which shows that larger firms attract more institutions. The correlation between ln(Value) and %INSID for the firms with data available on %INSID is -0.20, supporting the notion that smaller firms are more likely to be closely held by insiders. The simple correlation coefficient between ln(Value) and Res.Var. or Ret.Var. is about -0.40, indicating that larger firms have, in general, lower return variability. Also, the correlation between ln(Value) and either of the LOB variables is about 0.28, which shows that, on average, larger firms have more lines of business than smaller ones. The correlation between either proxy for return variability and either of the LOB variables is about -0.10, indicating that firms with more lines of business have lower return variability. The simple correlation between Res.Var. and Ret.Var. is 0.99,
Table 2

Correlation matrix for the explanatory variables involved in the regressions of the number of analysts.a,b

<table>
<thead>
<tr>
<th>Variable</th>
<th>NINST</th>
<th>% INST</th>
<th>% INSID</th>
<th>Ret. Var.</th>
<th>Res. Var.</th>
<th>RSQMKT</th>
<th>LOB1</th>
<th>LOB2</th>
<th>ln(Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NINST</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% INST</td>
<td>0.50</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% INSID</td>
<td>-0.26</td>
<td>-0.40</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.00)</td>
<td>(0.00)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ret. Var.</td>
<td>-0.18</td>
<td>-0.23</td>
<td>0.04</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.00)</td>
<td>(0.00)</td>
<td></td>
<td>(0.26)</td>
<td></td>
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</tr>
<tr>
<td>Res. Var.</td>
<td>-0.19</td>
<td>-0.25</td>
<td>0.04</td>
<td>0.99</td>
<td>1.00</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.21)</td>
<td>(0.00)</td>
<td></td>
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<tr>
<td>RSQMKT</td>
<td>0.62</td>
<td>0.53</td>
<td>-0.19</td>
<td>-0.13</td>
<td>-0.18</td>
<td>1.00</td>
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</tr>
<tr>
<td>(0.00)</td>
<td>(0.00)</td>
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<td>(0.00)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>LOB1</td>
<td>0.25</td>
<td>0.22</td>
<td>-0.10</td>
<td>-0.11</td>
<td>-0.11</td>
<td>0.17</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
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<td>(0.00)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOB2</td>
<td>0.24</td>
<td>0.22</td>
<td>-0.11</td>
<td>-0.11</td>
<td>-0.11</td>
<td>0.17</td>
<td>0.96</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(0.00)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ln(Value)</td>
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<td>0.57</td>
<td>-0.20</td>
<td>-0.39</td>
<td>-0.40</td>
<td>0.64</td>
<td>0.29</td>
<td>0.28</td>
<td>1.00</td>
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<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

aThe correlations are based on 1,409 observations except those involving %INSID, for which the number of observations is 966. Value is the market value of a firm's equity at the end of 1984. NINST is the number of institutions holding shares in a firm in 1985, and %INST is the percentage of a firm's shares held by them while %INSID is the percentage of a firm's shares held by insiders. LOB1 and LOB2 are two alternate proxies for the degree of diversification of the firm. Ret. Var. and Res. Var. are the estimated variances of a firm's daily return and the daily residuals from the market model during 1984. RSQMKT is the $R^2$ from the market model regression a firm's return on the market return for 1984.

bThe numbers in parentheses under the correlation coefficients indicate the two-tailed significance probabilities.

suggesting that the results across the two proxies should not be expected to differ much.

There may be important industry differences across firms, both in terms of aggregate demand or supply of analyst services. For example, the information acquisition costs may differ by industry, implying that ceteris paribus, there will be differences in the aggregate supply of analyst services for firms in different industries. To control for industry differences in analyst following, I classify the firms in the sample into six separate industries on the basis of their primary line of business. The industry groups chosen are: (1) Mining (two-digit SIC codes: 10–14), (2) Construction and Manufacturing (two-digit SIC codes: 15–39), (3) Transportation, Communication, and Other Public Utilities (two-digit SIC codes: 40–49), (4) Wholesale and Retail Trade (two-digit SIC codes:
50–59), (5) Finance, Insurance, and Real Estate (two-digit SIC codes: 60–67), and (6) Services (two-digit SIC codes: 70–96). The numbers of firms in the six industry groups are 79, 738, 180, 129, 185, and 98, respectively.

4. Results

Ordinary Least Squares (OLS) regressions are run with the number of analysts (\(N_{\text{ANAL}}\)) as the dependent variable. The explanatory variables chosen are the number of institutions holding shares in the firm (\(N_{\text{INST}}\)), the percentage of shares held by these institutions (\(\%_{\text{INST}}\)), the natural log of the market value of equity of the firm \([\ln(\text{Value})]\), a proxy for the return variability of the firm which is either \(\text{Ret.Var.}\) or \(\text{Res.Var.}\), the \(R^2\) from the market model regression (\(\text{RSQMKT}\)), and a proxy for the number of lines of business which is either \(\text{LOB1}\) or \(\text{LOB2}\).\(^{11}\) The approach chosen to control for industry differences is to use dummy variables for the six industry groups.\(^{12}\)

Table 3 presents the results of the regression with \(\text{LOB1}\) as the proxy for the number of lines of business and \(\text{Ret.Var.}\) as the proxy for return variability. The results are not sensitive to the proxies used for either return variability or the number of lines of business and are very similar across the various proxies used. Hence, I do not report the results for all the other sets of proxies.

White's (1980) test for heteroskedasticity indicated that the regression residuals may be heteroskedastic.\(^{13}\) Hence, in table 3 for each coefficient, there are two \(t\)-statistics reported. The unadjusted \(t\)-statistics are based on the OLS covariance matrix, while the adjusted ones are based on the heteroskedasticity-consistent covariance matrix [White (1980)]. The adjusted \(t\)-statistics are generally lower than the unadjusted, although the magnitudes of the two \(t\)-statistics are similar for most coefficients. The adjusted \(t\)-statistics of the coefficients indicate that all of the explanatory variables other than the industry dummies are significantly different from zero at the 5% level of significance. With the exception of \(\text{LOB1}\), all of them have \(t\)-statistics with absolute value greater than two. The adjusted \(R^2\) of the regression is 0.73

\(^{11}\)It can be argued that the variables \(N_{\text{INST}}\) and \(\%_{\text{INST}}\) may also be endogenous and in equilibrium are determined simultaneously with the number of analysts following the firm. I believe that for the regressions I estimate \(N_{\text{INST}}\) and \(\%_{\text{INST}}\) can be treated as exogenous variables for the most part and the simultaneity issue is not expected to have any serious consequences on the results.

\(^{12}\)Regressions were also performed with several alternate specifications. Since most of the variables are skewed, in one specification, regression was conducted using logs of all the variables (both dependent and independent) other than the industry dummies. Furthermore, since \(\text{Value}, \text{NANAL}, \text{and NINST}\) appear to be the most skewed variables, in another specification, regression was conducted logging only these variables. These alternate specifications lead to similar set of inferences to those reported.

\(^{13}\)The heteroskedasticity does not appear to be due to the skewness in the dependent variable. It was also present in the several alternate regression specifications (including those using log of \(\text{NANAL}\) as the dependent variable) that were estimated.
## Table 3
Regression results for the number of analysts for the whole sample.\(^a\)

\[
NANAL(i) = b_0 + b_1 NINST(i) + b_2 %INST(i) + b_3 Ret. Var.(i) + b_4 RSQMKT(i) + \ldots + b_5 \sum_{j=1}^{5} I_j(i) + e(i)
\]

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient</th>
<th>Unadjusted (t)-statistic(^b)</th>
<th>Adjusted (t)-statistic(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-14.45</td>
<td>-12.71</td>
<td>-10.35</td>
</tr>
<tr>
<td>NINST</td>
<td>0.04</td>
<td>13.79</td>
<td>6.97</td>
</tr>
<tr>
<td>%INST</td>
<td>0.04</td>
<td>3.90</td>
<td>3.29</td>
</tr>
<tr>
<td>Ret. Var.</td>
<td>1199.60</td>
<td>5.99</td>
<td>4.30</td>
</tr>
<tr>
<td>RSQMKT</td>
<td>9.42</td>
<td>3.88</td>
<td>2.71</td>
</tr>
<tr>
<td>LOBI</td>
<td>-0.15</td>
<td>-2.13</td>
<td>-1.98</td>
</tr>
<tr>
<td>(\ln(\text{Value}))</td>
<td>3.96</td>
<td>18.67</td>
<td>13.87</td>
</tr>
<tr>
<td>(I_1) (Mining)</td>
<td>3.16</td>
<td>3.16</td>
<td>3.46</td>
</tr>
<tr>
<td>(I_2) (Construction and Manufacturing)</td>
<td>-0.49</td>
<td>-0.69</td>
<td>-0.76</td>
</tr>
<tr>
<td>(I_3) (Utilities)</td>
<td>3.35</td>
<td>3.93</td>
<td>3.92</td>
</tr>
<tr>
<td>(I_4) (Wholesale and Retail Trade)</td>
<td>-1.44</td>
<td>-1.64</td>
<td>-1.87</td>
</tr>
<tr>
<td>(I_5) (Financial Institutions)(^d)</td>
<td>1.37</td>
<td>1.67</td>
<td>1.68</td>
</tr>
<tr>
<td>(F)-statistic</td>
<td>349.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)See table 1 for variable definitions. The number of observations for the regression is 1,409.

\(^b\)Based on the OLS covariance matrix.

\(^c\)Based on the heteroskedasticity-consistent covariance matrix.

\(^d\)The effect of the sixth category, \(I_6\) (Services), is captured in the constant \(b_0\).

indicating that the fitted model explains a significant fraction of the variation in the number of analysts. A partial \(F\)-test to check for the significance of the industry dummy variables as a group produced an \(F\)-statistic of 13.91, which is significant at the 1% level, indicating that the industry dummies as a group add to the explanatory power of the model.

To check whether the regression results reported in table 3 are significantly affected by outliers, all the (12) observations in which the fitted value was more than three standard deviations away from the actual value were dropped and regression was reestimated with the remaining observations. The results (not reported) of this regression indicate that none of the coefficients changes by more than 10–15% and all the \(t\)-statistics remain close to their original levels. It can thus be concluded that the results are not sensitive to the presence of outliers in the data.

To see how the degree to which a firm is closely held by insiders influences the extent of analyst following of a firm, the sample of firms for which data are available on the percentage of insider holdings (\(\%INSID\)) is examined. Table 4 reports the regression results for the number of analysts as the dependent
variable for this sample. The explanatory variables include %INSID in addition to those in table 3. The variable %INSID is significantly negative and all the other variables remain statistically significant with the exception of %INST.\textsuperscript{14}

It is interesting to note that in all these regressions almost all of the explanatory variables have strongly significant coefficients despite a good deal of multicollinearity amongst these variables. Thus, although the multicollinearity amongst these variables is likely to increase the standard error of estimates of the coefficients associated with these variables, one can still be reasonably sure that all these variables are important individually in explaining the variation in the dependent variable because of their strong $t$-statistics.\textsuperscript{15}

The results of these regressions can be interpreted as follows. The positive signs on $NINST$ and $%INST$ are consistent with the interpretation that the aggregate demand for analyst services increases as more institutions hold shares in a firm or the percentage held by them increases. Aggregate demand can increase with $NINST$ and $%INST$ if institutions, by virtue of their larger holdings, find it cost-effective to buy analyst services while for small investors this expenditure may not be justified. Another interpretation of these results is that the aggregate supply of analyst services is an increasing function of these variables. This can arise if the majority of the transactions business of brokerage houses comes from institutions. The results suggest that in-house analysis performed by institutions does not appear to be a substitute for services of outside analysts.

The observed negative sign on $%INSID$ in the regressions supports the notion that the demand for analyst services comes from noninsiders and this demand increases as the fraction of the firm held by insiders decreases. The negative sign is also consistent with the demand for analyst services being elastic and the cost of information acquisition increasing with the degree of insider holdings because of increased secrecy associated with higher insider holdings.

\textsuperscript{14}I also estimated this regression for the full sample of 1,409 firms assuming $%INSID$ equals zero for firms for which this number was not reported. The results from this regression are very similar to those reported in table 4 and in that regression all variables including $%INST$ are significant at the 5\% level.

\textsuperscript{15}To assess the impact of multicollinearity on the regressions, the procedure suggested in Belsley, Kuh, and Welsch (1980) was employed. For the regression results reported in table 3, the two highest condition indices were 12 and 22, respectively, indicating that regressors may be involved in weak near dependencies. The auxiliary regressions indicated that almost all regression coefficients are being degraded (i.e., multicollinearity is resulting in increases in their estimated variances). However, multicollinearity, although degrading, is not harmful since almost all the coefficients still remain statistically significant. Similarly, for the results in table 4 also, multicollinearity is degrading but not harmful.
### Table 4
Regression results for the sample with data available on insider holdings.a

\[ \text{NANAL}(i) = b_0 + b_1 \text{NINST}(i) + b_2 \% \text{INST}(i) + b_3 \text{Ret. Var.}(i) + b_4 \text{RSQMKT}(i) \]

\[ + b_5 \text{LOBI}(i) + b_6 \ln[\text{Value}(i)] + b_7 \% \text{INSID}(i) + \sum_{j=1}^{5} \beta_j I_j(i) + e(i) \]

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient</th>
<th>Unadjusted t-statistic</th>
<th>Adjusted t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-11.17</td>
<td>-8.90</td>
<td>-7.45</td>
</tr>
<tr>
<td>NINST</td>
<td>0.04</td>
<td>11.64</td>
<td>5.34</td>
</tr>
<tr>
<td>% INST</td>
<td>0.02</td>
<td>1.27</td>
<td>1.19</td>
</tr>
<tr>
<td>Ret. Var.</td>
<td>940.40</td>
<td>4.93</td>
<td>4.15</td>
</tr>
<tr>
<td>RSQMKT</td>
<td>12.87</td>
<td>4.67</td>
<td>3.35</td>
</tr>
<tr>
<td>LOBI</td>
<td>-0.23</td>
<td>-2.94</td>
<td>-2.61</td>
</tr>
<tr>
<td>\ln(\text{Value})</td>
<td>3.55</td>
<td>15.19</td>
<td>10.92</td>
</tr>
<tr>
<td>% INSID</td>
<td>-0.04</td>
<td>-3.49</td>
<td>-3.46</td>
</tr>
<tr>
<td>(I_1) (Mining)</td>
<td>3.97</td>
<td>3.83</td>
<td>3.98</td>
</tr>
<tr>
<td>(I_2) (Construction and Manufacturing)</td>
<td>-0.07</td>
<td>-0.09</td>
<td>-0.10</td>
</tr>
<tr>
<td>(I_3) (Utilities)</td>
<td>2.74</td>
<td>2.76</td>
<td>2.45</td>
</tr>
<tr>
<td>(I_4) (Wholesale and Retail Trade)</td>
<td>-1.18</td>
<td>-1.33</td>
<td>-1.41</td>
</tr>
<tr>
<td>(I_5) (Financial Institutions)</td>
<td>1.46</td>
<td>1.68</td>
<td>1.64</td>
</tr>
<tr>
<td>F-statistic</td>
<td>188.95</td>
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<td></td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td></td>
<td>0.70</td>
<td></td>
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</tbody>
</table>

*aSee table 1 for variable definitions. The number of observations for the regression is 966.

*bBased on the OLS covariance matrix.

*cBased on the heteroskedasticity-consistent covariance matrix.

The signs on the \(LOBI\) and the \(RSQMKT\) variables are negative and positive, respectively. These signs are consistent with the demand for analyst services being elastic and the information acquisition cost increasing as the number of lines of business of the firm increases or the firm becomes less correlated with the market. In section 2 it was argued that the information acquisition cost increases with the number of lines of business and it decreases as the squared correlation coefficient between the firm’s return and the market return increases. If demand is elastic, equilibrium total expenditures will be lower for firms with more lines of business and will increase as the squared correlation coefficient between the firm’s and the market returns increases. There is thus indirect evidence on the demand for analyst services being elastic.

The sign on the \(\ln(\text{Value})\) variable is positive and strongly significant. This finding is consistent with the aggregate demand for analyst services increasing with firm size because of increased benefits of private information for larger firms. Assuming elastic demand, the positive sign is also consistent with the
aggregate supply increasing with firm size. This increase in aggregate supply can result from the increased potential transactions business that larger firms bring to the analysts’ companies.\textsuperscript{16} The results on firm size are consistent with the previous research which suggests that more information is generated and analyzed for larger versus smaller firms [e.g., Grant (1980), Atiase (1985), Collins, Kothari, and Rayburn (1987), and Freeman (1987)].

Another interpretation for the observed positive sign on the ln(Value) variable is that there are firm characteristics excluded from the model that are important in influencing information acquisition about firms and firm size, being correlated with these variables, proxies for their overall effect. The positive sign on firm size is consistent with the omitted variables being positively correlated with firm size and their overall impact on total expenditure being positive.

The positive sign on Ret.Var. variable in these regressions is consistent with the argument provided in section 2 that the demand for analyst services is an increasing function of the variability of return because expected trading profits are higher for firms with higher return variability. If information acquisition cost does not significantly increase with return variability, then total expenditure is likely to be positively related to return variability and the observed positive relation between analyst following and return variability is consistent with it.

Since the industry dummy variables as a group add significantly to the explanatory power of the model, I conclude that a firm’s industry influences its extent of analyst following. One obvious way this influence can enter is that the nature of the industry affects the cost of acquiring information: for some industries, information may be inexpensive to acquire, while for others one may have to spend considerable resources to get any information. Another possibility is that ceteris paribus, the aggregate demand for analyst services is different for firms in different industries. In the regressions, the coefficients associated with the industry dummy variables $I_1$ and $I_3$ are significantly positive, showing that, ceteris paribus, total equilibrium expenditures on analyst following are higher for mining companies and utilities than for firms in service industries. Assuming that demand for analyst services is elastic, one interpretation of this finding is that the cost of information acquisition may be lower for firms in these two industries than for those in the service industry. Another interpretation is that aggregate demand for analyst services for mining companies and utilities is higher than those for firms in the service industry.

\textsuperscript{16}The positive sign is also consistent with the cost of information acquisition increasing as firm size increases, but then the adverse effect of this increased cost on total expenditure has to be less than the positive effect of the increased demand (or increased supply because of higher potential transactions business) on total expenditure.
5. Conclusions

The main purpose of this paper was to examine the factors that lead to differences in analyst following of firms. A simple model of analyst following was proposed and several variables were suggested that are likely to influence the extent of analyst following of firms either through their effect on aggregate demand or supply of analyst services. Almost all of these variables were found to be strongly significant in affecting the extent of analyst following of firms and the empirical results generally accord well with economic intuition.

I believe that the area of analyst coverage of firms is an interesting one from the viewpoints of both theory and empirical work. The model presented in the paper relegated to the background many of the important considerations of uncertainty, free-ridership, and the role of prices in aggregating and transmitting information. More sophisticated models will clearly improve our understanding of the economics of analyst following and the various considerations that are involved in an analyst's choice of which firms to follow.

On the empirical front also, this issue of analyst coverage merits more attention. For example, in the paper a simplifying assumption was made that all analysts are of the same quality. One question is whether there are differences in the quality of analysts and whether superior analysts concentrate on following a given set of firms? If so, what factors lead to this concentration? Analysts provide a multitude of services, but not the same kinds of service for all firms they follow. What are the different services that analysts provide and what factors lead to an analyst's choice of particular set of services to provide for a firm? Finally, if a firm characteristic influences both the aggregate demand and supply of analyst services, the methodology used in the paper cannot be used to separately identify the two effects since I had data available only on the number of analysts following a firm. Data on the prices of analyst services for different firms can be used in conjunction with the number of analysts following a firm to separately identify the two effects.

Appendix: Derivation of eq. (4)

Comparative statics on eq. (3) implies

\[ \frac{\partial TC^*}{\partial k_i} = Q^*(\frac{\partial P^*}{\partial k_i}) + P^*(\frac{\partial Q^*}{\partial k_i}). \]  \hspace{1cm} (A.1)

Q* and P* must also satisfy eqs. (1) and (2), i.e.,

\[ Q^* = D(P^*, k_1, k_2, \ldots, k_n) \] \hspace{1cm} (A.2)

and

\[ Q^* = S(P^*, k_1, k_2, \ldots, k_n). \] \hspace{1cm} (A.3)
Differentiating each of eqs. (A.2) and (A.3) with respect to $k_i$,

$$\frac{\partial Q^*}{\partial k_i} = \left( \frac{\partial D}{\partial P} \right) \left( \frac{\partial P^*}{\partial k_i} \right) + \frac{\partial D}{\partial k_i}$$  \hspace{1cm} (A.4)

and

$$\frac{\partial Q^*}{\partial k_i} = \left( \frac{\partial S}{\partial P} \right) \left( \frac{\partial P^*}{\partial k_i} \right) + \frac{\partial S}{\partial k_i}. \hspace{1cm} (A.5)$$

Solving for $\frac{\partial P^*}{\partial k_i}$ and $\frac{\partial Q^*}{\partial k_i}$, using eqs. (A.4) and (A.5), one gets

$$\frac{\partial P^*}{\partial k_i} = \frac{\left( \frac{\partial D}{\partial k_i} - \frac{\partial S}{\partial k_i} \right)}{\left( \frac{\partial S}{\partial P} - \frac{\partial D}{\partial P} \right)}$$  \hspace{1cm} (A.6)

and

$$\frac{\partial Q^*}{\partial k_i} = \frac{\left[ \left( \frac{\partial S}{\partial P} \right) \left( \frac{\partial D}{\partial k_i} \right) - \left( \frac{\partial D}{\partial P} \right) \left( \frac{\partial S}{\partial k_i} \right) \right]}{\left( \frac{\partial S}{\partial P} - \frac{\partial D}{\partial P} \right)}.$$ \hspace{1cm} (A.7)

By substituting for $\frac{\partial P^*}{\partial k_i}$ and $\frac{\partial Q^*}{\partial k_i}$ from eqs. (A.6) and (A.7) in eq. (A.1) and using the definitions of supply and demand elasticities $\varepsilon_s$ and $\varepsilon_d$, it is straightforward to arrive at eq. (4) in the text.

References


