

Advertising, Breadth of Ownership, and Liquidity

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We provide empirical evidence that a firm's overall visibility with investors, as measured by its product market advertising, has important consequences for the stock market. Specifically we show that firms with greater advertising expenditures, *ceteris paribus*, have a larger number of both individual and institutional investors, and better liquidity of their common stock. Our findings are robust to a variety of methodological approaches and to various measures of liquidity. These results suggest that the investors' degree of familiarity with a firm may affect its cost of capital and consequently its value.

"Buy what you know," advises Peter Lynch, the well-known former portfolio manager of Fidelity's Magellan Fund, while the celebrated investor Warren Buffet urges others to buy "great brands" [Henry (1998)]. Such comments may reflect the view of many investors, with mounting evidence suggesting that people do indeed bias their portfolio investment decisions in favor of the "familiar."¹ However, the documentation of such a bias leaves unclear what effect, if any, it has on firms and on their common stock. This issue is the focus of our study.

If investors buy a firm's stock, at least in part because of their general familiarity with the firm, we expect that this visibility among investors will generally lead to a larger breadth of ownership of the firm's stock. However, such investors would be relying on information that is public (and not necessarily substantive), and as a result, such purchases may be best

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¹ While there have been prior related studies (discussed below), Huberman (2001) is the first to explicitly tie investors' familiarity with a company to their decisions to purchase its stock.

characterized as uninformed trades and such investors as uninformed traders. If greater visibility does indeed lead to a relative increase in uninformed traders, then such an improvement in firm recognition would be expected to have a beneficial impact on the stock's liquidity.² The aim of our article is to test these conjectures relating firm visibility to ownership breadth and stock market liquidity.

If investors favor more familiar firms, then we would expect some measure of firm visibility to be related to this investment bias. We adopt the firms' product market advertising expenditures as such a measure. As Bagwell (2001, p. 1) writes in his survey of the economics of advertising, "Consumers encounter advertising messages as they watch TV, read magazines, listen to the radio, surf the internet, or simply walk down the street." While such advertising is presumably aimed at increasing the firm's market share in the product market, at a minimum it should make the firm's name and products better known to both consumers and investors. Therefore, assessing a firm's visibility by its advertising expenditures has intuitive appeal and is in fact similar to the practice of some marketing professionals of using advertising as a measure of a product's brand recognition. *Brandweek's* list of "America's Top Brands," for example, is constructed in this way. Therefore, with advertising as a good proxy for the overall visibility of a firm, our results apply broadly to firms with national (or international) brand identity.³

We test whether a firm's product market advertising has a spillover effect on its ownership structure and the liquidity of its common stock. While economists have long debated the relative importance of the different ways in which advertising may affect product market demand, there has been no apparent recognition, either by academic researchers or business professionals, that the visibility that such advertising provides a firm may have important effects in other markets (e.g., the stock market). Such an effect need not be intentional — in fact, the absence of any apparent general recognition of such a spillover suggests that it is likely unintentional in most cases. However, in particular cases, the nature of the firms' advertising campaigns suggests that at least these companies may be seeking recognition beyond the markets for their products. Generally such firms conduct advertising campaigns that leave their products, and often even the nature of their businesses, unidentified. For example, BASF, a multinational chemical firm engaged in business-to-business, advertises in consumer media and informs us only that "We don't make the products you buy—we make the products you buy better." Another interesting

² Most microstructure models view liquidity as an increasing function of the level of noise or uninformed trading relative to that of informed trading.

³ Our study complements and generalizes others, to be discussed, that document investors' preference for geographic proximity.

example is NTT DoCoMo. This company has a full-page advertisement in the September 1998 issue of the *Economist* asking readers: "Why is NTT DoCoMo advertising in an American magazine?" Their answer: "Well, NTT DoCoMo is the #1 Japanese mobile telecom company listed on the New York Stock Exchange."^{4,5}

Such advertising is puzzling if one views it as meant to influence (solely) product market demand. However, investors—both individuals and institutions—are exposed to mass media and such advertising would at least make them aware of the firm. As Merton (1987) notes, a potential investor must, at a minimum, know of a firm before deciding whether to purchase its stock or whether to acquire additional information.

Our results indicate that firms that spend more on advertising, *ceteris paribus*, have a larger number of both individual and institutional investors. Further, we find that advertising has a stronger effect on individuals than institutions. This result is consistent with recent evidence of a "home bias" among investors and suggests that advertising helps to attract a disproportionate number of investors who, at least in part, make their investment decisions based on familiarity rather than on more fundamental information. As mentioned above, the public nature of advertising information suggests that the investors attracted to a firm by such advertising are likely to be uninformed. If this indeed is the case, we expect greater advertising by a firm to decrease the adverse selection costs, thereby improving market liquidity. Consistent with this prediction, we do find a positive relation between advertising and stock market liquidity. Specifically, we find that, *ceteris paribus*, firms that have greater advertising expenditures also have common stocks with lower bid-ask spreads, smaller price impacts, and greater depth.

Our results on ownership complement those of other recent studies that imply that investors are more likely to hold familiar stocks. For example, French and Poterba (1991) document that investors overweight their portfolios with domestic stocks. Kadlec and McConnell (1994) show that a firm's listing on the New York Stock Exchange (NYSE), possibly making it better known to investors, is associated with an increase in the number of shareholders and with a reduction in bid-ask spreads. Similarly Foerster and Karolyi (1999) show that non-U.S. firms that list on U.S. exchanges, possibly raising their visibility among investors, realize abnormal returns around the listing period.⁶

⁴ Representatives of this company told us that the main objective of this advertising campaign is to attract new investors.

⁵ But note that even for these firms, we have no direct evidence that they are aware of any relation between advertising and the liquidity of their stocks.

⁶ Of course, we must be careful in attributing the observed effects solely to an increase in visibility. For example, the listing of a stock on a particular exchange may also involve other important elements, such as a difference in reporting requirements.

Along a similar line, Coval and Moskowitz (1999) find that U.S. portfolio fund managers prefer investing in locally headquartered firms, while Grinblatt and Keloharju (2001) and Huberman (2001) find that investors prefer to invest in local (familiar) companies. Furthermore, there is evidence that employees allocate a large fraction of their retirement savings to their own company's stock [see, e.g., Benartzi (2001)]. The recurring theme in these studies is that investors apparently have a home bias — that is, a preference for the familiar, as best characterized by Huberman (2001). While we provide additional support for this bias, our article's main contribution is that we show how these seemingly suboptimal investor decisions can have a significant effect on the firm and on the stock market.

Our empirical study is also related to the basic idea in Merton (1987). Merton develops a model that incorporates limited investor recognition of stocks and analyzes the capital market equilibrium in this setting, including the implications for asset prices. He shows that those firms that are relatively unfamiliar to investors should provide higher expected stock market returns and exhibit lower liquidity. While our study does not address the issue of expected returns, it does verify that more familiar stocks have larger shareholder bases and better liquidity.

Our results also shed new light on the economics of advertising. For decades, economists have studied how advertising conveys product market information [Stigler (1961), Telser (1964), Nelson (1974), Bagwell and Ramey (1994), Grossman and Shapiro (1984), Kihlstrom and Riordan (1984), and Milgrom and Roberts (1986)], how it creates brand loyalty [Robinson (1933), and Tirole (1995)], and finally, how it serves as an input in consumers' utility functions [Stigler and Becker (1977), Becker and Murphy (1993)].⁷ These effects of advertising on the firm relate solely to product market demand; therefore our results propose a new unexplored capital market channel by which product market advertising may affect firm value.

Finally, since a firm's improved visibility may increase the breadth of its ownership and improve the liquidity of its stock, it also may increase the firm's value. While our study does not present direct evidence on this issue, recent literature does indeed identify a link between ownership or liquidity and value. For example, Benston and Hagerman (1974), Amihud, Mendelson, and Uno (1999), and Chen, Hong, and Stein (2002) find that firms may benefit from an increase in ownership breadth, while other studies suggest that stock market liquidity may be positively priced in asset returns through a decrease in the cost of equity [see Amihud and Mendelson (1986), Reinganum (1990), Eleswarapu and Reinganum (1993), Brennan and Subrahmanyam (1995), Amihud, Mendelson,

⁷ For example, consumers may value the prestige attached to the purchase of a particular good that is highly advertised.

and Lauterbach (1997), Eleswarapu (1997), Brennan, Chordia, and Subrahmanyam (1998), and Easley, Hvidkjaer, and O'Hara (2002)]. Interestingly, our findings suggest that while the direct effect of advertising on profits is unclear [see Bagwell (2001)], advertising may nevertheless increase shareholder value through this capital market spillover effect.

The rest of the article is organized as follows. Section 1 describes the sample selection procedure, defines the variables, and provides summary statistics. Section 2 examines the relation between advertising and breadth of ownership. Section 3 examines the relation between advertising and several measures of stock market liquidity. Section 4 checks the robustness of some of our results. Finally, Section 5 concludes with a discussion of the implications of our findings.

1. Sample Selection, Variable Definitions, and Summary Statistics

1.1 Sample selection

Our initial sample consists of all the companies that appear on the Industrial Compustat files (full-coverage, primary, secondary, tertiary, and research files) for at least one year over the period 1993–1998. From this initial sample, we select those firms that have available data on the Center for Research in Security Prices (CRSP) files and the Trades and Quotes (TAQ) database. Since the focus of our article is the effect of firms' advertising expenditures on breadth of ownership and stock liquidity, we include only observations in our final sample that have data available (nonmissing values) on advertising expenditures. This filtering greatly reduces our sample size. However, we cannot distinguish firms that do not report their advertising expenses from those that simply have zero advertising. As a result, we report only our analysis of those firms that provide advertising expenses. However, all our results are found to be qualitatively similar when we assume instead that all missing observations for advertising expenditures are equal to zero.

To reduce the effect of outliers on the liquidity measures, we also exclude observations that have an annual average turnover ratio greater than 500% and/or an annual average quoted spread greater than \$5. This process generates a final sample of 5776 firm-year observations over the period 1993–1998. Our sample starts in 1993, the beginning of the TAQ database.

1.2 Variable definitions

We obtain data on advertising expenditures (item 45) from Compustat. This variable is defined as the cost of advertising media (radio, television, newspapers, periodicals, etc.) and promotional expenses. Data on total assets (item 6), number of shares outstanding (item 25), share price (item 24), operating income before depreciation (item 13), and number of common shareholders (item 100) are also obtained from Compustat.

The market value of the equity is equal to the number of shares outstanding multiplied by the share price. The return on assets is defined as the operating income before depreciation scaled by total assets. The number of institutional investors is collected from Compact Disclosure.⁸

Return volatility, firm age, average monthly stock return, average monthly share volume, and share turnover are collected from CRSP. Return volatility is computed as the standard deviation of daily returns over the year. Firm age is constructed as the number of years the firm has existed on the CRSP database. Average monthly stock return is the annual average of monthly stock returns. Average monthly share volume is the annual average of monthly share volumes. Share turnover is the annual average of total monthly trading volume divided by the number of shares outstanding.

Finally, quoted and relative bid-ask spreads, quoted depth, and relative price impact are collected from the NYSE report of the TAQ database. We follow Weston (2000) in filtering the trade and quote data for errors.⁹ Average quoted spreads for each stock-year are based on the difference between the inside ask and bid price over all quotes on the firm's primary exchange. Relative spreads are constructed as the quoted spread divided by the midpoint of the bid and ask prices. Monthly spreads are based on the equally weighted time-series average over all quotes for each firm-month. Annual spreads are then based on the equally weighted time-series average over all months. The quoted depth is constructed as the average number of shares quoted at the inside bid and ask prices. We average this measure of the depth over all quotes on the primary exchange for each stock-month.¹⁰ Annual figures are then constructed as the average over all months in the year for each stock. The relative price impact measure,

$$\text{relative price impact}_t = \left[\frac{M_t - M_{t+\tau}}{M_t} \right] Q_t, \quad (1)$$

is constructed as the percentage difference between the midpoint of the spread and the midpoint of the spread that arises after the trade is executed, multiplied by a trade indicator variable, Q_t , which takes on values of 1 or -1 for buyer-initiated and seller-initiated trades,

⁸ Anderson and Lee (1997) find this to be one of the most reliable sources of ownership information.

⁹ This filtering process is very similar to the one developed by Huang and Stoll (1996).

¹⁰ It is important to note that the quoted depth on the NASDAQ may be less informative than the quoted depth on the NYSE. This is due to the fact that the inside depth for NASDAQ stocks only represents the depth of the inside dealer and not the aggregate market depth [as for the NYSE or American Stock Exchange (AMEX)]. Further, NASDAQ depth may have less variation due to the common practice of "autoquoting" a depth of 1000 shares. While there is no reason to suspect any systematic bias from NASDAQ quoted depths, we replicate our results using quoted depth only for NYSE and AMEX stocks and our results are robust and qualitatively similar.

respectively.¹¹ The subscript τ is the time horizon after the trade is executed. We estimate the price impact using a five-minute time horizon, recognizing that our results are unlikely to be sensitive to the five-minute lag procedure since other studies have found little difference in this measure when 5-, 10-, 15-, or 30-minute lags are used [see Huang and Stoll (1994) and Weston (2000)].

1.3 Summary statistics

Panel A of Table 1 displays some descriptive statistics for our sample. A few important points should be mentioned. First, the percentiles of the distribution of advertising expenditures, firm age, market value, total assets, return on assets, average monthly stock returns, and share price in this table show that our sample contains firms having a wide range of characteristics. Second, this table also shows that there are significant cross-sectional differences in the breadth of ownership and liquidity of the sample firms. For example, the number of shareholders ranges from 100 (5th percentile) to 42,000 (95th percentile) and the number of institutional investors ranges from 0 (5th percentile) to 324 (95th percentile). Furthermore, the relative bid-ask spread ranges from 0.4% (5th percentile) to 13.7% (95th percentile) and the share turnover ranges from 8.9% (5th percentile) to 182.6% (95th percentile). Comparing the means and medians for many of our variables reveals the usual left-skewness found in cross-sectional comparisons. As a result, we use log-transformations for most of the analysis presented below.

Panel B of Table 1 presents a comparison of our sample firms with firms that have missing values for advertising. Note that the firms in our sample have approximately the same age, average monthly stock return, share price, and return volatility as the firms with missing values for advertising. Of interest is that, while the sample firms have a larger market capitalization than the rest of the population, they are smaller in terms of total assets.¹² Overall the evidence in panel B suggests that even though we include only firms that have available data on advertising expenditures, we have a relatively unbiased sample from the population of Compustat firms.

2. The Effect of Advertising on the Breadth of Ownership

In this section we examine if investors are more likely to buy stocks of companies with high levels of advertising expenditures. We do this by testing whether cross-sectional patterns in a firm's advertising are related

¹¹ The trade indicator variable is constructed following the Lee and Ready (1991) algorithm with adjustments made for the NASDAQ market following Ellis, Michaely, and O'Hara (2000).

¹² This is consistent with the view that advertising is an intangible asset.

Table 1
Summary statistics

Panel A: Sample description						
	Mean	Std. Dev.	5th percentile	Median	95th percentile	No. of observations
Firm characteristics						
Advertising expenses (million \$)	71.79	285.3	0.07	3.27	337.6	5776
Firm age (years)	10.91	8.93	1	8	27	5776
Market value of equity (million \$)	1953	9067	7	105	7441	5776
Total assets (million \$)	2592	14,005	6	118	10,464	5776
Return on assets	0.057	0.463	-0.38	0.119	0.292	5765
Average monthly stock return	0.009	0.056	-0.073	0.009	0.094	5776
Share price (\$)	18.53	21.06	1.38	11.88	56.79	5776
Return volatility	0.043	0.031	0.014	0.036	0.097	5776
Breadth of ownership						
Number of shareholders (1000s)	15.61	105.1	0.1	1.34	42	5497
Number of institutional shareholders	70.11	130.42	0	23	324	5608
Liquidity measures						
Quoted bid-ask spread	0.318	0.28	0.104	0.229	0.716	5776
Relative bid-ask spread	0.044	0.053	0.004	0.027	0.137	5776
Quoted depth (100s)	29.58	51.11	5.59	10.57	110.46	5685
Relative price impact (%)	0.157	0.174	0.026	0.114	0.463	5495
Share turnover	67.01	57.71	8.87	50.39	182.59	5654
Average monthly share volume (millions of shares)	3.561	11.4	0.031	0.582	15.326	5776

	Sample firms			Firms with missing values for advertising		
	Mean	Median	No. of observations	Mean	Median	No. of observations
Panel B: Comparison of the sample firms with firms with missing values for advertising						
Firm characteristics						
Advertising expenses (million \$)	71.79	3.27	5776	—	—	—
Firm age (years)	10.91	8	5776	10.69	8	28,608
Market value of equity (million \$)	1953	105	5776	968	103	28,608
Total assets (million \$)	2592	118	5776	3155	161	26,633
Return on assets	0.057	0.119	5765	0.022	0.089	26,220
Average monthly stock return	0.009	0.009	5776	0.010	0.012	28,608
Share price (\$)	18.53	11.88	5776	18.16	13.57	28,608
Return volatility	0.043	0.036	5776	0.042	0.033	28,608
Breadth of ownership						
Number of shareholders (1000s)	15.61	1.34	5497	10.55	1.34	22,596
Number of institutional shareholders	70.11	23	5608	50.88	19	27,940
Liquidity measures						
Quoted bid-ask spread	0.318	0.229	5776	0.362	0.239	28,608
Relative bid-ask spread	0.044	0.027	5776	0.045	0.027	28,608
Quoted depth (100s of shares)	29.58	10.57	5685	28.07	10.36	28,138
Share turnover	67.01	50.39	5654	58.25	43.17	28,163
Average monthly share volume (millions of shares)	3.561	0.582	5776	2.023	0.447	28,608

This table reports summary statistics for our sample firms. To be included in the sample, the observation must satisfy the following criteria: the firm's financial data are available on the Industrial Compustat files, the Center for Research in Security Prices (CRSP) files, and the Trades and Quotes (TAQ) database; the firm has data available (nonmissing values) on advertising expenditures; the firm has an annual average turnover ratio of less than 500% and an annual average quoted spread of less than \$5. Advertising expenses, market value of equity, total assets, share price, return on assets (operating income before depreciation scaled by total assets), and the number of shareholders are collected from Compustat. Firm age is constructed as the number of years the firm has existed on the CRSP database. Average monthly stock return is constructed from CRSP as an annual average of monthly returns. Return volatility is computed as the standard deviation of daily returns over the year. The number of institutional shareholders is collected from Compact Disclosure. Share turnover is constructed from CRSP as an annual average of total monthly volume divided by shares outstanding. Average monthly share volume is constructed from CRSP as the annual average of monthly share volumes. Relative and quoted bid-ask spreads are collected from the TAQ database. Quoted depth is constructed from TAQ as the average number of shares quoted at the inside bid and ask prices. Relative price impact is constructed from TAQ as the percentage difference between the midpoint of the spread and the midpoint of the spread that arises after a trade is executed, multiplied by a trade indicator variable, Q_{it} , which takes on values of 1 or -1 for buyer-initiated and seller-initiated trades, respectively.

to the firm's total number of common shareholders and to the number of institutional owners. It is important to note that we are using total advertising expenditures rather than a scaled measure such as the ratio of advertising to sales or to assets because the various scaled measures do not gauge the *scope* of advertising. For example, General Motors (GM), one of the largest advertisers in the United States, spent \$3.7 billion on advertising in 1998. While this amount represented less than 3% of its sales, GM most likely gained considerable recognition from its advertising campaign. On the other hand, Audible Inc. spent only \$0.3 million on advertising in 1998, but this amount represented more than 82% of its sales. Since it is quite likely that an advertising campaign of \$3.7 billion will reach a wider population of potential investors than an advertising campaign of \$0.3 million, we expect the dollar amount of advertising to be a better proxy for investor visibility than the scaled measures.

2.1 Univariate analysis

Table 2 presents a portfolio analysis of the relationship between advertising and ownership breadth. In this analysis we examine if the breadth

Table 2
The effect of advertising on the breadth of ownership: univariate analysis

Advertising quintile	Market value quintile				
	Smallest	2	3	4	Largest
Panel A: Number of shareholders (in 1000s)					
Smallest	1.23	1.05	1.51	2.22	5.21
2	1.01	1.69	1.86	3.15	9.26
3	1.11	1.90	2.39	3.03	26.36
4	1.16	1.69	2.51	3.74	62.90
Largest	5.04	5.29	6.71	24.48	212.47
Difference (largest–smallest)	3.8 ^b	4.24 ^b	5.20 ^b	22.26 ^a	207.26 ^a
Panel B: Number of institutional investors					
Smallest	3.7	9.5	20.7	45.9	117
2	3.5	12.4	23.2	50.8	155
3	4.0	12.2	24.5	54.0	198
4	4.5	14.3	26.4	58.4	270
Largest	6.1	14.2	32.3	64.5	511
Difference (largest–smallest)	2.4 ^a	4.7 ^b	11.6 ^a	18.6 ^a	394 ^a

This table presents a comparison of equally weighted portfolio means for different measures of breadth of ownership by quintile of market value of equity and advertising expenses. Portfolios are formed by first partitioning the sample into quintiles based on market capitalization. Each market value quintile is then partitioned into five subgroups based on advertising expense quintiles. Reported averages are based on equally weighted cross-sectional means. Advertising expenses, market value of equity, and the number of shareholders are collected from Compustat. The number of institutional shareholders is collected from Compact Disclosure. The significance levels of the differences are based on a two-tailed *t*-test with a sampling frequency for each cell given by the number of firms in each cell.

^{a,b}Significantly different from zero at the 1% and 5% level, respectively.

of ownership increases with advertising even after controlling for firm size. We form portfolios by first partitioning the sample into quintiles based on market capitalization. Each market value quintile is then partitioned into five subgroups based on advertising expense quintiles. Each cell in Table 2 represents the equally weighted portfolio mean of either the total number of shareholders (panel A) or the number of institutional owners (panel B). Panels A and B of Table 2 indicate that the larger the advertising expenditures, controlling for size, the larger the total number of shareholders and the number of institutional investors. Of particular interest is that the average number of shareholders and institutional investors in the largest advertising quintiles is always greater than in the smallest quintiles. These differences in means between the largest and smallest advertising quintiles are economically and statistically significant in all the market value quintiles. For the smallest market value quintile, panel A (panel B) shows that the average difference in the number of shareholders (number of institutions) between the firms in the largest and smallest advertising quintiles is approximately equal to 3800 shareholders (2.4 institutions). For the largest market value quintile, panel A (panel B) shows that the average difference in the number of shareholders (number of institutions) between the firms in the largest and smallest advertising quintiles is approximately equal to 207,260 shareholders (394 institutions). Since large firms tend to have much larger advertising budgets than small firms do, it is not surprising that the relation between advertising and breadth of ownership is stronger among large firms. Overall the results in Table 2 show that greater advertising does indeed relate to a larger shareholder base, irrespective of firm size.¹³

2.2 Regression analysis

In this subsection we analyze in a multivariate regression framework the contemporaneous relation between advertising expenditures and the number of shareholders and institutions. To control for any confounding effects, we use a variety of control variables in our multivariate regressions.

We expect the number of shareholders to be highly influenced by firm size (capitalization). For example, not only are larger firms more likely to have greater analyst coverage and more press coverage, they may simply have more shares available to buy. Therefore we include the market value of equity as a control variable to account for such size effects.

Since transaction costs may motivate some investors to prefer stocks within certain price ranges, we include the reciprocal of the share price as

¹³ Note that the evidence in Table 2 suggests that the relationship between breadth of ownership and advertising may be nonlinear. While there is no reason to suspect any bias from such a relation, we employ both log-transformations and fixed-effects estimation in our tests, which mitigates the potential impact of outliers or nonlinearity.

an additional control. Also, more liquid stocks may be preferred by a larger group of investors and so we also include share turnover. We also use return on assets (ROA) and stock price performance (stock returns) as control variables since investors are likely to be attracted to firms that are doing well.

Return volatility and firm age are employed as proxies for differences in total risk across our sample. Finally, we include annual dummy variables to control for any systematic change in our variables over time due to inflation or business cycle effects. To reduce the potential impact of outliers and skewness in many of our control variables, we use log transformations for all continuous variables.

It is important to note that many of our control variables may also proxy for familiarity, visibility, or investor recognition. For example, large firms (size) that are profitable (ROA), that have existed for a long time (age), and that are exchange listed (NYSE dummy) are also likely to be better known to investors. Consequently our tests for the effect of advertising on shareholder breadth will bias our analysis *against* finding any relation and *understate* advertising's true economic effect.

Since we are using pooled cross-sectional time-series data in our estimations, the assumptions of the ordinary least squares (OLS) model are likely to be violated. Thus we estimate two types of panel data models to address this econometric issue. First, to address the concern that observations from the same firm may not be independent, we estimate regressions relating the intrafirm means of the dependent variable to the intrafirm means of the independent variables. We label the estimates from this type of regression as "between-firm" estimates. Second, to control for unknown firm-specific factors that may influence the breadth of ownership or the liquidity, we estimate regressions that include firm fixed effects. We label the estimates from this type of regression as "within-firm" estimates.

Table 3 presents the results from the multivariate analysis. Consistent with the results in Table 2, we find a positive relation between advertising expenditures and both the total number of shareholders and the number of institutional investors. The coefficient of advertising expenditures is positive and significantly different from zero for both types of panel data models.

These results are also economically significant. For example, an interpretation of the coefficients on advertising expenditures from columns (1) and (3) of Table 3 suggests that a change of one standard deviation in advertising expenditures would increase the number of shareholders (institutions) by 98.7% (11.9%), independent of any changes in firm size, profitability, trading activity, or risk. The fact that advertising has a greater effect on common shareholders than on institutional investors suggests that individual investors are more likely than professional investors to rely on such nonfinancial criteria as familiarity to pick stocks.

Table 3
The effect of advertising on the breadth of ownership: regression analysis

Dependent variable	Log(no. of shareholders)		Log(no. of institutional shareholders)	
	Between-firm estimates (1)	Within-firm estimates (2)	Between-firm estimates (3)	Within-firm estimates (4)
Log(advertising)	0.248 ^a (0.017)	0.072 ^a (0.018)	0.030 ^b (0.015)	0.081 ^a (0.028)
Log(firm age)	0.247 ^a (0.019)	0.154 ^a (0.025)	0.262 ^a (0.018)	0.357 ^a (0.042)
Average monthly stock return	-0.661 ^c (0.355)	-0.171 (0.107)	-2.345 ^a (0.330)	-1.425 ^a (0.171)
Return on assets	-0.028 (0.026)	-0.022 (0.029)	0.065 ^a (0.024)	0.041 (0.048)
Log(market value)	0.175 ^a (0.016)	0.054 ^a (0.014)	0.548 ^a (0.014)	0.343 ^a (0.022)
1/(share price)	0.145 ^a (0.031)	0.094 ^a (0.028)	-0.010 (0.030)	0.059 (0.045)
Log(turnover)	-0.004 (0.020)	0.006 (0.012)	0.221 ^a (0.018)	0.080 ^a (0.019)
Log(return volatility)	0.162 ^a (0.051)	0.059 ^b (0.024)	-0.202 ^a (0.046)	0.087 ^b (0.038)
NASDAQ indicator	-0.177 ^a (0.050)		0.065 (0.045)	
AMEX indicator	-0.209 ^a (0.076)		-0.129 ^c (0.071)	
Year-indicator variables	Yes	Yes	Yes	Yes
Firm-indicator variables	No	Yes	No	Yes
N	5374	5374	5483	5483
Adjusted R ²	0.563	0.525	0.784	0.753

This table reports estimates of panel regressions relating the number of shareholders and the number of institutions to advertising expenses and other control variables. Advertising expenses, market value of equity, share price, return on assets (operating income before depreciation scaled by total assets), and the number of shareholders are collected from Compustat. Firm age is constructed as the number of years the firm has existed on the CRSP database. Average monthly stock return is constructed from CRSP as an annual average of monthly returns. Return volatility is computed as the standard deviation of daily returns over the year. The number of institutional shareholders is collected from Compact Disclosure. Share turnover is constructed from CRSP as an annual average of total monthly volume divided by shares outstanding. AMEX and NASDAQ dummy variables indicate the firm's primary exchange. We use standard panel data techniques to estimate the parameters of the regression models. Standard errors are reported in parentheses below coefficient estimates.

^{a,b,c}Significantly different from zero at the 1%, 5%, and 10% level, respectively.

Standards errors have been adjusted for heteroscedasticity.

We find some evidence that stock returns are negatively related to both the number of common shareholders and the number of institutional investors. While this result may seem counterintuitive, the notion that poorly performing stocks have a larger breadth of ownership, *ceteris paribus*, is consistent with recent evidence on the existence of a “disposition effect” whereby investors hold past losers and sell past winners.¹⁴

¹⁴ Empirical evidence of the disposition effect [based on the prospect theory of Kahneman and Tversky (1979)] has been shown for experimental subjects [Camerer and Weber (1998)], individual investors [Odean (1998)], professional money managers [Shapira and Venezia (2001)], and even for professional futures traders [Locke and Mann (2001)].

3. The Effect of Advertising on Liquidity

In the previous section we showed that top advertisers generally have a larger number of both institutional investors and shareholders. These results suggest that advertising attracts a disproportionate number of investors who make their investment decisions based on familiarity rather than on more fundamental information. An implication of this is that advertising may affect stock market liquidity through its effect on the composition of traders. Thus it is plausible that a firm's advertising reduces adverse selection costs by increasing the proportion of such uninformed traders in the market for the firm's stock.

Of interest is that such clustering is similar in spirit to the intertemporal clustering in Admati and Pfleiderer (1988), where discretionary liquidity traders find it optimal in equilibrium to strategically time their trades so as to hide among other uninformed investors. In our setting, these liquidity traders could optimally and rationally cluster in the cross section (rather than intertemporally). In these models, the uninformed know they are uninformed. Our results may also be understood as uninformed investors mistaking their knowledge of a firm — because of its visibility — for relevant information. In other words, the uninformed may not realize they are uninformed. In this case, they are clumping in high-visibility stocks because those are the ones they are aware of. Our empirical efforts obviously cannot distinguish between these theories, but in either case there is an improvement in liquidity when more uninformed traders are in the market.

Since several theoretical models argue that bid-ask spreads increase in the presence of adverse selection costs [see, e.g., Amihud and Mendelson (1986) and Glosten and Milgrom (1985)], then we should expect bid-ask spreads to decline with increases in advertising. Following the same reasoning, we should also expect the quoted depth (relative price impact) to increase (decrease) with the level of advertising.

In this section we investigate these predictions of the relation between advertising expenditures, relative bid-ask spreads, quoted depth, and relative price impact. To check the robustness of our results, we also examine in Section 4 the relation between advertising expenditures and other liquidity measures.

3.1 Univariate analysis

Table 4 presents a comparison by quintile of market value and advertising expenses of equally weighted portfolio means for the relative spreads, quoted depth, and relative price impact. Panel A shows that relative spreads (the cost per dollar invested) decline with the level of advertising in all market-value quintiles. The differences in the average relative spread between the largest and smallest advertising quintiles are economically and statistically significant.

Table 4
The effect of advertising on liquidity: univariate analysis

Advertising quintile	Market value quintile				
	Smallest	2	3	4	Largest
Panel A: Relative bid-ask spreads (%)					
Smallest	12.56	5.85	3.62	2.01	0.88
2	11.13	5.52	3.34	1.79	0.70
3	10.34	5.52	3.32	1.65	0.58
4	10.97	4.86	3.25	1.58	0.48
Largest	9.21	4.59	2.80	1.26	0.35
Difference (largest–smallest)	−3.35 ^a	−1.26 ^a	−0.82 ^a	−0.75 ^a	−0.53 ^a
Panel B: Quoted depth (100s of shares)					
Smallest	10.88	11.55	15.65	17.67	31.29
2	13.25	12.30	19.14	21.70	48.56
3	12.09	16.24	16.22	21.00	65.63
4	13.56	14.39	21.24	32.64	68.99
Largest	18.15	26.81	44.92	51.20	114.72
Difference (largest–smallest)	7.27 ^b	15.26 ^a	29.27 ^a	33.53 ^a	83.43 ^a
Panel C: Relative price impact (%)					
Smallest	0.27	0.18	0.14	0.12	0.09
2	0.27	0.20	0.14	0.12	0.07
3	0.27	0.19	0.14	0.11	0.07
4	0.32	0.19	0.14	0.11	0.06
Largest	0.29	0.20	0.15	0.09	0.04
Difference (largest–smallest)	0.02	0.02	0.01	−0.03 ^a	−0.05 ^a

This table presents a comparison of equally weighted portfolio means for different measures of liquidity by quintile of market value of equity and advertising expenses. Portfolios are formed by first partitioning the sample into quintiles based on market capitalization. Each market value quintile is then partitioned into five subgroups based on advertising expense quintiles. Reported averages are based on equally weighted cross-sectional means. Advertising expenses and market value of equity are collected from Compustat. Relative bid-ask spreads are collected from the TAQ database. Quoted depth is constructed from TAQ as the average number of shares quoted at the inside bid and ask prices. Relative price impact is constructed from TAQ as the percentage difference between the midpoint of the spread and the midpoint of the spread that arises after a trade is executed multiplied by a trade indicator variable, Q_t , which takes on values of 1 or −1 for buyer-initiated and seller-initiated trades, respectively. The significance levels of the differences are based on a two-tailed *t*-test with a sampling frequency for each cell given by the number of distinct firms in each cell.

^{a,b}Significantly different from zero at the 1% and 5% level, respectively.

Panel B in Table 4 shows that the quoted depth increases with advertising expenses in all market-value quintiles. Furthermore, panel C shows that the relative price impact declines with the level of advertising in market-value quintiles 4 and 5. In general, the results in Table 4 show that the degree of adverse selection declines with our measure of stock recognition.

3.2 Regression analysis

In this subsection we analyze the relationship between advertising expenditures and liquidity in a multivariate framework that controls for other factors that may affect liquidity. We control for firm size with the market

Table 5
The effect of advertising on liquidity measures: regression analysis

Dependent variable	Log(relative bid-ask spread)		Log(quoted depth)		Log(relative price impact)	
	Between-firm estimates (1)	Within-firm estimates (2)	Between-firm estimates (3)	Within-firm estimates (4)	Between-firm estimates (5)	Within-firm estimates (6)
Log(advertising)	-0.011 ^b (0.005)	-0.047 ^a (0.011)	0.064 ^a (0.009)	0.051 ^a (0.017)	-0.046 ^a (0.011)	-0.080 ^a (0.029)
Log(firm age)	-0.030 ^a (0.006)	-0.070 ^a (0.015)	0.036 ^a (0.011)	0.173 ^a (0.024)	0.007 (0.013)	0.227 ^a (0.039)
Return on assets	-0.004 (0.009)	-0.007 (0.018)	0.001 (0.015)	-0.116 ^a (0.028)	-0.008 (0.038)	-0.031 (0.065)
Log(market value)	-0.278 ^a (0.005)	-0.347 ^a (0.008)	0.108 ^a (0.009)	-0.183 ^a (0.013)	-0.130 ^a (0.010)	-0.260 ^a (0.022)
1/(shareprice)	0.022 ^b (0.011)	0.027 (0.017)	0.066 ^a (0.019)	0.265 ^a (0.027)	-0.165 ^a (0.040)	-0.030 (0.046)
Log(turnover)	-0.261 ^a (0.007)	-0.209 ^a (0.007)	0.122 ^a (0.012)	0.130 ^a (0.011)	-0.085 ^a (0.014)	-0.032 (0.020)
Log(return volatility)	0.674 ^a (0.017)	0.567 ^a (0.015)	0.430 ^a (0.029)	-0.082 ^a (0.023)	0.570 ^a (0.037)	0.275 ^a (0.039)
NASDAQ indicator	0.271 ^a (0.017)		-1.324 ^a (0.029)		-0.276 ^a (0.033)	
AMEX indicator	-0.073 ^a (0.026)		-0.405 ^a (0.045)		0.270 ^a (0.052)	
Year-indicator variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm-indicator variables	No	Yes	No	Yes	No	Yes
N	5643	5643	5554	5554	5266	5266
Adjusted R ²	0.942	0.924	0.685	0.045	0.554	0.484

This table reports estimates of panel regressions relating liquidity measures on advertising expenses and other control variables. Advertising expenses, market value of equity, share price, and return on assets (operating income before depreciation scaled by total assets) are collected from Compustat. Firm age is constructed as the number of years the firm has existed on the CRSP database. Return volatility is computed as the standard deviation of daily returns over the year. Share turnover is constructed from CRSP as an annual average of total monthly volume divided by shares outstanding. Relative bid-ask spreads are collected from the TAQ database. Quoted depth is constructed from TAQ as the average number of shares quoted at the inside bid and ask prices. Relative price impact is constructed from TAQ as the percentage difference between the midpoint of the spread and the midpoint of the spread that arises after a trade is executed multiplied by a trade indicator variable, Q_i , which takes on values of 1 or -1 for buyer-initiated and seller-initiated trades, respectively. AMEX and NASDAQ dummy variables indicate the firm's primary exchange. We use standard panel data techniques to estimate the parameters of the regression models. Standard errors are reported in parentheses below coefficient estimates.

^{a,b}Significantly different from zero at the 1% and 5% level, respectively.

Standards errors have been adjusted for heteroscedasticity.

value of equity and the inverse of share price. Since we expect stocks with a high trading activity to have lower spreads, smaller price impacts, and larger quoted depths, we include share turnover. We also include return volatility and firm age to proxy for total risk. Finally, we include stock exchange dummy variables to control for systematic market microstructure differences.

Table 5 presents results from the regressions relating relative spreads, quoted depth, and relative price impact on advertising and other control variables. Consistent with the results in the previous subsection, we find

that the relative spread and the relative price impact are negatively correlated with advertising, while the quoted depth is positively correlated with advertising. All the coefficients on advertising expenditures are significantly different from zero in all specifications.

As in the previous section, the results in Table 5 are economically significant. The estimates of the coefficients on advertising in columns (1), (3), and (5) suggest that an average firm that changes its advertising expenditures by one standard deviation would experience a 4.5% decline in relative spreads, a 25.4% increase in the quoted depth, and an 18.3% decline in the relative price impact, independent of any changes in firm size, profitability, trading activity, or risk. Overall the findings in this section suggest that firms with greater advertising tend to have better stock liquidity.

4. Robustness

4.1 Matched sample methodology

While the regression results presented above suggest a positive relation between advertising expenses, breadth of ownership, and various measures of liquidity, these results may be suspect if there is a nonlinear relation between ownership and our control variables. That is, since the level of advertising expenses is highly correlated with firm size, price, and volatility, it may be that this measure of investor recognition is simply a proxy for some nonlinearity in the relationship. To account for this potential misspecification, we estimate the effect of advertising activity on breadth of ownership and liquidity using a matched sample methodology. For each firm-year we find another firm-year in our sample that closely resembles that observation in price, size (market value), and volatility (variance of returns).¹⁵

After matching the firms, we examine how the differences in advertising between the sample and matching firms affect the differences in breadth of ownership and liquidity between them. The advantage of this procedure is that we are comparing observations in our sample that *ideally* differ only in their advertising expenses. As a result, inferences concerning differences in breadth of ownership and liquidity should be independent of the functional relationship between these measures and size, price, or total risk.

The results from this analysis (not reported) suggest that our results are not driven by nonlinearities. Consistent with our previous results, we find that more visible stocks (measured by advertising) tend to have a wider shareholder base and better liquidity. Further, the economic magnitude

¹⁵ We also try alternative matching variables such as total assets, return on assets, average market return, and age, and the results are qualitatively the same.

and statistical significance of our results from the matched sample analysis are consistent with those from the regression analysis.

4.2 Alternative specifications

To ensure that our results are truly due to advertising, we also examine the sensitivity of the results reported in the previous sections to our choice of control variables. Specifically we reestimate the regressions in Tables 3 and 5 using different controls for size (total assets, total sales), balance sheet items (debt-to-equity ratio, market-to-book ratio, lagged return on assets, dummy variable for firms that pay dividends), and other factors (number of analysts following the stock, dummy variable for firms that are part of the S&P 500 index, lagged stock returns). We find that our previous results are not sensitive to these alternative specifications.

4.3 Controlling for the status quo bias

There is evidence that individuals tend to maintain their previous decisions despite new information [see, e.g., Samuelson and Zeckhauser (1988), and Hartman, Doane, and Woo (1991)]. If investors also behave in a similar manner, they may not change their position in a stock as frequently as they should. This suggests that stocks may have a “core” shareholder base that in the short run is insensitive to factors such as advertising expenditures, profitability, stock returns, etc. Given that we analyze the contemporaneous relation between advertising and breadth of ownership, a status quo bias may raise econometric problems if this “core” shareholder base is spuriously correlated with the level of advertising. However, since we find a positive and significant relationship between breadth of ownership and advertising in our fixed-effect regressions (which theoretically controls for any firm-specific heterogeneity like a status quo bias), we do not believe that the results in this article are driven by a status quo bias.

Nevertheless, to further investigate this issue, we also correct for the effects of a status quo bias by assuming that current levels of the dependent variable are also a function of lagged dependent variables. The idea behind this specification is that if investors tend to maintain their prior decisions, then the number of shareholders (institutions) in the past should be a good predictor of the number of shareholders (institutions) in the future. Although this seems to be a reasonable approach, including lags of the dependent variable as regressors introduces further econometric complications. To deal with these problems, we use methods developed by Anderson and Hsiao (1981) and Arellano and Bond (1991) to estimate the parameters of a dynamic panel regression model. Consistent with the results of fixed-effects analysis presented in Table 3, we find (not reported) that changes in advertising are positively correlated with changes in the

number of shareholders and institutions. These results further confirm that our findings are not driven by the status quo bias.¹⁶

4.4 Alternative measures of liquidity

To ensure that our results regarding liquidity are not specific to our choice of measures, we reestimated the regressions in Table 5 using alternative estimates of liquidity. We replicated the analysis in Table 5 using the quoted spread, the effective spread, the relative effective spread, the realized spread, and the relative realized spread. The effective spread is equal to twice the difference of the transaction price and the spread midpoint. Annual measures are computed in the same fashion as for relative spreads. The relative effective spread is equal to the effective spread scaled by the midpoint of the spread. The realized spread measures the revenue to the market maker net of the price impact. The relative realized spread is equal to the realized spread scaled by the quote midpoint.

Consistent with our previous results, we find that all these measures of liquidity improve with the level of advertising. That is, firms that spend more money on advertising, *ceteris paribus*, tend to have smaller quoted spreads, effective spreads, relative effective spreads, realized spreads, and relative realized spreads.

The only measure of liquidity that appears to be only weakly correlated with advertising expenditures is the turnover ratio. We do not find evidence that this variable is positively correlated with advertising expenditures in the regression analysis. However, we do find some evidence indicating that share turnover increases with advertising expenditures in the matched sample analysis. One potential reason for this positive relation between advertising and turnover in the matched sample analysis but not in the regression analysis is that the relation between these two variables may be nonlinear. Thus, even for the only measure of liquidity for which we have less supporting evidence, we nevertheless find some evidence that it is positively correlated with advertising expenditures.

While liquidity is certainly multidimensional, we find strong results for most standard measures of liquidity, thereby confirming that our findings are not specific to any particular measure.

5. Conclusion

There is mounting evidence that investors exhibit a home bias, tending to favor investments in firms that are familiar to them either because of

¹⁶ In addition to these tests, we examine whether long-run percentage changes in advertising between 1993 and 1998 are determinants of ownership breadth and liquidity. The results from this analysis are also consistent with our main results.

geographic proximity or some other feature. Using a firm's product market advertising as a measure of investors' familiarity with the firm, we provide additional support for the existence of this bias. Most importantly, however, we show that it has important implications for firms and for the stock market. We document that greater product market advertising by firms is associated with a larger shareholder base (for both total shareholders and institutions) and with a significant improvement in the liquidity of their common stock. Our findings are robust to a variety of methodological approaches and to various measures of liquidity—regardless of how we conduct the analysis, our qualitative results remain unchanged. These results suggest a new capital market channel by which advertising may affect firm value.

Our results, perhaps surprisingly, are quite strong. The simple, public information that is conveyed by product market advertisements appears to be very important in investor decisions. Of course, investors must, at a minimum, be aware of a firm before it can be considered as a potential investment; a firm's advertising, even if it accomplished nothing else, would at least make people aware of its existence.¹⁷ In addition, if such advertising actually promotes the sale of the firm's products to new consumers, it may also affect the demand for its stock. Investors may feel more confident in their ability to identify a firm as a good investment, the more they know of the firm and of its business, as Peter Lynch suggests. The Beardstown Ladies, one of the well-publicized investment clubs, claims to "buy what it knows." For example, the club members said that they bought Hershey stock after having tasted the company's products [Herring (1998)]. If we view such investors as gaining no *private* information from advertising, we can readily understand the improvement in stock market liquidity. A firm's advertising may attract uninformed investors to its stock, resulting in a reduction in adverse selection costs and a consequent increase in the liquidity of its common stock. The Beardstown Ladies most likely had heard of Hershey's, but decided to invest in the company only after being convinced to sample one of its products. In this case, Hershey's advertising campaign may have motivated the sale of its product and subsequently also the purchase of its stock.

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¹⁷ Viewing advertising in this way, as simply informing investors, relates our analysis to that of Merton (1987). Of course, one wonders how such public information can be informative.

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