Geographic Dissemination of Information

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Abstract: Urban companies are located near millions more potential investors and sophisticated money managers than non-urban companies. More investors are familiar with urban companies and have access to informal information about them. The stock of urban companies is also more liquid than the stock of non-urban companies. We hypothesize that these factors lead information to be spread from urban companies to other companies. Urban stock returns lead rural/small city stock returns even controlling for size, industry, and analyst coverage. Closer examination of the lead-lag relation reveals that urgent trades, which are likely to reflect short-lived information, are much more common for urban firms. Information appears to be uncovered through informal means more easily available to people physically near a company. We discuss the corporate finance implications of our findings.

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1. Introduction

Information plays a central role in all economic models in both asset pricing and corporate finance. A central question is how information is disseminated. Hayek (1945) notes that the price mechanism is an efficient provider of information. This is especially true for localized information of time and place. Smith (1991) remarks that local shareholders have a lower marginal cost of obtaining information. If localized information is more easily obtained by investors in close proximity to the main source of information, one might expect the dissemination of prices (i.e., information) to flow from more densely populated areas to more sparely populated areas of the country.

This paper explores the way physical proximity to investors affects the dissemination of information across stocks in the U.S. during 1973-2002. Many people and many potential investors are located near companies headquartered in urban areas, defined as the ten largest metropolitan areas of New York City, Los Angeles, Chicago, Washington, San Francisco, Philadelphia, Boston, Detroit, Dallas, or Houston. Money managers and major brokerage firms are sited predominantly in our urban metropolitan areas. Stocks of companies headquartered in rural or small city areas, defined as locations outside the top ten metropolitan areas, have fewer people and fewer investors nearby. We examine the lead-lag relation between urban and rural/small city stocks to test whether information spreads from stock of companies located in heavily populated areas to stock of companies located farther from potential investors.

We report two major findings. First, for a sample of over 19,000 different firms we show that the returns of urban company stock portfolios lead the returns of rural/small city company stock portfolios; rural/small city stocks do not lead urban stocks. This lead-lag relation is not explained by differences in size, industry, or analyst coverage. The information the financial markets appear to first incorporate into urban-based stocks is then absorbed into the stock prices of firms headquartered outside the largest ten U.S. metropolitan areas. This slow spread of information is consistent with the theoretical work of Hong and Stein (1999).

Second, there is direct evidence that more informed trading takes place in urban Nasdaq stocks than rural/small city Nasdaq stocks. We examine trades that take place for 1,000 shares, the typical quoted depth for Nasdaq stocks. Several microstructure studies find that "urgent trades" of this type are more likely to be made on short-lived or perishable information than other trades. We demonstrate that urgent trades constitute a higher proportion of total trades for urban stocks than non-urban stocks. This finding is consistent with the role of serendipity in information collection (see Subrahmanyam and Titman (1999)). Urban-based companies have more potential investors who could, by chance, stumble across and trade on valuable information.

It is well established that both institutions and individuals invest disproportionately in nearby companies. Huberman (2001) speculates that one reason for the bias toward local companies appears to be familiarity. When news is revealed that is relevant for a number of companies, investors are likely to first trade the local stocks that are familiar – and for most investors these will be urban stocks. Hence, we expect to see information that is common to many firms spread from urban to rural/small city stocks.

Coval and Moskowitz (2001), Grinblatt and Keloharju (2001), and Ivkovic and Weisbenner (2005) point to a second reason for investors' bias toward local firms - superior access to information. Both individual investors and institutions earn significantly higher returns on their local investments than on their positions in stocks in farther away companies. Malloy (2005) finds that analysts do a better job of forecasting earnings in nearby companies even after adjusting for underwriting relationships.

Our key contribution is noting the informal ways information is discovered and diffused across stocks. Urban stocks are based in cities with many investors. Thus informal sources of information about them, such as conversations with employees or customers, are available to many potential traders and investors. Local media coverage of local companies also reaches large numbers of investors in urban areas. Our urban areas have large concentrations of institutional investors, brokers, and investment bankers, and we would expect these sophisticated investors to be the most adept at uncovering or interpreting information that is relevant for the valuation of numerous stocks in an industry or sector.

Understanding how new marketwide or industrywide information will affect the value of individual stocks requires background information on companies. The impact of new marketwide information will be more readily understood for local stocks. This suggests that more investors will more quickly grasp the implications of marketwide or industrywide news for urban stocks than for rural/small city stocks because it is easier/cheaper to obtain information on local stocks, this implies a dispersion of information from urban to other stocks.

There are two obvious corporate finance implications of the paper. First, the fact that rural firms lag the returns of urban firms has timing ramifications for the share repurchase decisions of corporations. If the stock market is having a strong return on a given day, the implication is for rural/small city managers to immediately purchase the shares instead of waiting a day. Since rural/small city firm stock returns lag the returns of urban companies, it would be cheaper for the firm to repurchase shares prior to the next day price increase. Recall that corporate managers have discretion in when the open market share repurchases are preformed.

The second corporate finance implication of our findings deals with the announcement of accelerated seasoned equity offerings. Bortolotti, Megginson, and Smart (2006) note that accelerated follow-on offerings are becoming much more prevalent. These accelerated equity offerings are popular due to the ability to get the deal done quickly. This exposes the issuing firm to less price risk during the underwriting period prior to the offering. Rural/small city mangers should delay having an accelerated bought deal after a market rise. These managers should wait until the following day to price the offering with the investment banker. This delay in the timing of the accelerated offering will enable the firm to get higher proceeds, all else being equal.

The structure of this paper is as follows. We discuss our hypotheses and provide a literature review in Section 2. In Section 3, we describe our data and methodology. The empirical results are in Section 4 and we conclude in Section 5.

2. Hypotheses and literature review

2.1. Transmission of information for different-sized companies

While we are the first to test whether information is disseminated from urban to other stocks, other researchers have looked at lead-lag relation for evidence on information flows. Hong, Torous, and Valkanov (2007) hypothesize that the gradual spread of information across different assets may lead to cross-asset return predictability. They test this by looking at lead-lag relation between portfolios of stocks in specific industries and the market portfolio as represented by the CRSP value-weighted index. They find that several industries, including retail, services, commercial real estate, metal, and petroleum, can forecast market returns for up to two months ahead.

Brennan, Jegadeesh, and Swaminathan (1993) separate New York Stock Exchange (NYSE), American Stock Exchange (Amex), and Nasdaq stocks over 1977–1988 into stocks covered by many analysts and by few analysts. They find that returns on stocks covered by many analysts Granger-cause returns on stocks with few analysts, even after adjusting for firm size. Similarly, firms covered by many analysts respond more quickly to market returns than firms covered by few analysts.

Lo and MacKinlay (1988), Boudoukh, Richardson, and Whitelaw (1994), and McQueen, Pinegar, and Thorley (1996) document that returns on portfolios of small stocks lag returns on portfolios of large stocks. Other researchers document more subtle differences in the autocorrelation patterns. Hou (2006) finds that negative returns drive the lead-lag relation between large and small stocks. Sias and Starks (1997) report that, even after holding size constant, portfolios of stocks with heavy institutional ownership are more highly autocorrelated, perhaps because institutions spread buying over several days. McQueen, Pinegar, and Thorley (1996) find that portfolios of small firms lag portfolios of large firms for positive market returns, but not for negative ones.

2.2. The impact of location on a firm's corporate actions

There are numerous papers in the corporate finance literature that examine how a firm's location affects the decisions made by the firm. Almazan, de Motta, Titman, and Uysal (2006) find that firms located within an industry cluster tend to have more acquisitions and have lower debt ratios then companies not located within a cluster. Kedia, Panchapagesan, and Uysal (2005) find that geographic proximity affects the stock returns gained by the bidder in an acquisition. They find that transactions where both the bidder and the target firms are local, the bidder receives a higher share of the surplus created. It is proposed that this gain is derived from greater information advantages arising from close geographic proximity. The three authors find that the effect is even stronger when both the target and bidder are located more than 50 km outside of the largest 21 US cities.

Geographic proximity between parties has even been found to affect the duration of contractual agreements. Ciccotello, Piwowar, and Hornyak (2007), using a large sample of US

Air Force research agreements, find that parties located in remote rural areas use longer term contracts. The authors propose that the lack of viable alternatives encourages remote firms to lock themselves into the longer term research agreements.

2.3. Location and the dispersion of information

The critical difference between urban and rural/small city stocks is that, by definition, urban stocks are located near many people and hence near many potential investors. For rural and small city stocks, by definition, fewer people and fewer investors are located nearby. We contend that these differences in and of themselves will cause common information to spread from urban to non-urban stocks. There are three reasons to expect information to be spread in this way.

The first reason is familiarity. Investors hold and trade stocks in companies that are familiar to them, and, because they are nearby, urban stocks are local companies and familiar to more people than otherwise similar non-urban stocks. When information that is pertinent to several companies becomes public, investors will first trade the stocks that are familiar to them – which will be urban stocks for most investors.

Some recent research presents evidence that familiarity makes investors more likely to hold or trade local stocks. Huberman (2001) shows that customers of the regional Bell operating companies are much more likely to own shares in the telephone company providing their service than another telephone company. Coval and Moskowitz (1999) examine the distance from a mutual fund's base to the companies the funds held in their portfolios in 1995. On average, funds were located about 10% closer to the companies they held in their portfolios than to the market as a whole. Ivkovic and Weisbenner (2005) examine the stock investments of over 30,000 households in the continental United States from 1991 through 1996. They find that the average household invests 32% of its portfolio in companies located within 250 miles of it.

Huberman (2001) observes that familiarity, not information advantage is likely to explain why investors overweight nearby company stock. Information would be expected to lead investors to underweight local stocks at times rather than always overweight them. Since urban companies will be local companies and to more people, and thus more familiar, they are more likely to be bought or sold when information that affects multiple companies is revealed.

The second reason to expect information to spread from urban to other stocks is information availability. Background information on individual companies is needed if an investor is to understand the implications of marketwide or industrywide news for a company. Smith (1991) notes that information on local stocks is more easily and cheaply obtained by local shareholders. Further, urban companies are local companies for more people.

Evidence that information is more readily available on local stocks comes from several sources. Ivkovic and Weisbenner (2005) find that retail investors earn 3.2% more per year on local stocks than on their other investments. Coval and Moskowitz (2001) report that mutual funds earn significantly higher returns on their holdings of firms located within 100 kilometers of them than on their more distant-firm holdings. These observations, combined with the fact that urban companies are local companies to more people than rural/small city stocks, suggest that information on urban stock is more readily available to more investors than information on other stock.

Our research, like other research claiming investors have an information advantage in local stocks, is unspecific on how investors learn about local companies. It seems likely that investors learn about local stocks through local media, which naturally provide disproportionate coverage of local firms. Information might also be conveyed by casual evidence that a store's parking lot is crowded or that some company's employees are working a lot of overtime.

Another source of information would be conversations with employees and customers. Estimation of employee morale is one example of important information investors can gain through contacts with a firm's workers. Finally, investors are likely to learn about investment opportunities from other local investors. Hong, Kubik, and Stein (2005) provide evidence that information spreads among mutual fund managers in the same city by word of mouth.

Our third reason for proposing that information should be spread from urban company to other company stock is that urban stocks appear to be more liquid. Loughran and Schultz (2005) compare the liquidity of urban and rural stock over 1988–2002 (firms headquartered in one of the ten largest metropolitan areas versus firms headquartered at least 100 miles from a metropolitan area of 1 million or more residents). After adjustment for size, analyst coverage, institutional holdings, inclusion in the S&P 500, and other variables, there is significantly less turnover for rural stock than for urban stock over 1988–2002. Similarly, the ratio of turnover to return is lower for rural stocks.

Although some earlier work on local information advantages has focused on firm-specific information (Audretsch and Feldman (1996) and Audretsch and Stephan (1996), for example), other research has documented slow information diffusion across stocks (Hong, Torous, and Valkanov (2007) and Hou (2006), for example).

3. Data and methodology

The University of Chicago's Center for Research in Security Prices (CRSP) provides the stock returns, SIC classifications, shares outstanding, and share price information for the sample. The data set is restricted to New York Stock Exchange (NYSE), American Stock Exchange (Amex), or Nasdaq firms with ordinary common equity (as classified by CRSP). To minimize the impact of low-priced stocks, we require a firm to have a stock price of at least $5 two days before entering the sample on any particular trading day. Information on trade sizes and quotes is obtained from the New York Stock Exchange's Trade and Quote (TAQ) dataset. Analyst coverage information is obtained from I/B/E/S and is available starting in 1976. We define analyst coverage as the number of analysts reporting current fiscal year annual earning estimates prior to adding a stock to the daily portfolios.

To classify a company as urban or rural/small city, we follow the practice of a number of authors, including Coval and Moskowitz (1999), Zhu (2002), Ivkovic and Weisbenner (2005), and Loughran and Schultz (2005), and use company headquarters as a proxy for location. We obtain the headquarter locations for 19,611 different companies from Compustat, Nasdaq, and Moody's.

A company is defined as located in an urban area if the company headquarters is in the metropolitan areas of New York City, Los Angeles, Chicago, Washington, San Francisco, Philadelphia, Boston, Detroit, Dallas, or Houston. We include companies located in suburbs of these ten cities in the urban portfolio. Thus, companies based in Evanston, Illinois, a suburb of Chicago, or Greenwich, Connecticut, a suburb of New York, are included in the urban portfolio.[1]

We define a company as located in a rural/small city area if its headquarters is not in the metropolitan area of the top ten cities. Firms headquartered in either Fairfield, Iowa, or Denver, Colorado, are thus included in the rural/small city portfolio.

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[1] Results are similar for other definitions of urban cities. For example, all of our results are similar when urban stocks are defined as those located in New York City, Los Angeles, Chicago, San Francisco, and Boston.

4. Sample Characteristics and Results

Table 1 reports summary statistics for our urban and rural/small city sample for the 1973–2002 sample period and for three ten-year subperiods. Over 1973-2002 there are 7,576 trading days. For each trading day, a portfolio of urban and rural company stock is created. Firms must have a stock price two days prior of at least $5 to enter the sample on a given trading date. There are an average of 1,471.9 urban firms and 2,406.7 rural/small city firms in the daily portfolios. So, each trading day, on average, over 3,800 firms with a stock price of at least $5 are included in our analysis.

Both portfolios report an average daily return of slightly less than 0.06% during the time period. Even with over 7,500 trading days, a test for a difference in mean returns produces a t-statistic of only -1.41. Hence, the average return does not differ significantly between urban and other geographic areas.

Urban firms are on average substantially larger than other firms. The mean market value is $1,322 million for urban companies compared to $783 million for rural/small city companies. Consistent with results in Loughran and Schultz (2005) and Malloy (2005), urban firms are covered by more analysts than the typical non-urban firm. A higher percentage of rural/small city firms are listed on Nasdaq (57%) than urban firms (46%).

Another difference between the samples is industry concentration. Following Hou (2006), we use Fama and French (1997) for industry classification definitions. Urban firms have the highest percentage of concentration in the Business Services Industry (10%) while 11% of non-urban firms are in the Trading Industry. Retail represents 5% of both urban and rural/small city firms.

Columns 3-8 in Table 1 report characteristics for three equal subperiods: 1973-1982, 1983-1992, and 1993-2002. In each subperiod, rural/small city firms are smaller, more numerous, more likely to trade on Nasdaq, covered by fewer analysts, and are more likely to be in the Utility Industry and less likely to be in the Business Services Industry than urban firms.

4.1. Rural and Urban Portfolio Return Regressions

To examine whether urban stock portfolios lead or lag non-urban stock portfolios, we run an ordinary least squares regression:

Urban (Rural/Small City) Portfolio Return$_t$ =
$a_0 + a_1$Urban Ret$_{t-1}$ + a_2Urban Ret$_{t-2}$ + a_3Urban Ret$_{t-3}$ + a_4Urban Ret$_{t-4}$ + a_5Urban Ret$_{t-5}$ + a_6Rural/Small City Ret$_{t-1}$ + a_7Rural/Small City Ret$_{t-2}$ + a_8Rural/Small City Ret$_{t-3}$ + a_9Rural/Small City Ret$_{t-4}$ + a_{10}Rural/Small City Ret$_{t-5}$ + e_t

For each regression, the dependent variable is the urban or rural/small city stock portfolio returns in day t. The independent variables are five lagged urban portfolio returns (day t-1 to day t-5) and five lagged rural/small city portfolio returns (day t-1 to day t-5). In all of the portfolio regressions, we use equally weighted stock returns. These regressions are run on a number of portfolios including different urban and non-urban stocks in the tables to follow. For the most part, we concentrate our attention on the coefficients of the returns from day t-1. In each regression, we formally test whether the lagged urban and rural/small city coefficients are statistically different.

Since the returns of urban and non-urban stocks are easily observable, we do not expect it to take several days for information from one group of stocks to be impounded in the prices of the others. Thus coefficients on the prior day's returns should be the best indicators of where information is discovered. Nevertheless, because small firms in particular exhibit autocorrelation at several days, we include a full week of lagged returns in all regressions.

Table 2 reports the results when all urban and rural/small city stocks are used to form the portfolios. With urban returns as the dependent variable during the 1973-2002 period, column 1 reports a coefficient on lagged 1-day urban returns of 0.47 (t-statistic of 4.51). The t-statistics (reported in parentheses) are calculated using White's (1980) heteroskedasticity-consistent method. The coefficient on lagged 1-day rural/small city returns is -0.27 (t-statistic of -1.91).

In column 2, the dependent variable is rural/small city portfolio returns over the entire sample period. Only the 1-day urban lagged returns (0.28 coefficient with t-statistic of 3.37) and not the 1-day rural lagged returns (-0.07 coefficient with t-statistic of -0.58) has power in explaining rural/small city stock returns. Rural/small city returns at a 5-day delay have some explanatory power for rural stock returns. So, the regressions in columns 1 and 2 provide our first evidence that urban stocks lead non-urban stocks, but rural/small city stocks do not lead urban stocks.

The p-value from an F-test of the hypothesis that the 1-day lagged urban and 1-day lagged rural/small city coefficients are equal is also reported in each column. In column 1, for example, the p-value is 0.003, indicating clear rejection of the hypothesis that the coefficients are equal. The p-value of 0.080 in column 2 indicates that there is a difference in the 1-day lagged coefficients at only the 8% level.

The other columns in the table report regressions for three separate ten-year subperiods: 1973–1982, 1983–1992, and 1993–2002. In the subperiod results, the urban stock portfolio return is a positive and statistically significant function of its last day's return. The urban stock portfolio does not lag the rural/small city stock portfolio in any subperiod, and in fact seems to be generally negatively related to the previous day's rural returns. There is no evidence that rural/small city stocks lead urban stocks in any subperiod.

Columns 6 through 8 report subperiod regressions of the rural/small city stock portfolio on its own lagged returns and the lagged returns of the urban portfolio. Here there is also strong evidence that urban stocks lead rural/small city stocks. The coefficient on the prior day's urban stock return is 0.65 for 1973–1982, and 0.84 for 1983–1992. These coefficients indicate economic significance: 65% and 84% of urban stock returns on day t-1 show up in the returns of rural/small city stocks on day t. With t-statistics of 4.24 and 4.05, these coefficients are also significant statistically. P-values testing whether the 1-day lagged coefficients are equal are easily rejected at the 1% level in columns 6 and 7.

These significant coefficient values have implications for rural/small city managers in corporate events like share repurchase programs and accelerated seasoned equity offerings. For share repurchases, rural/small city managers should not delay buying shares if comparable urban firms are having a good day. In addition, non-urban managers should delay an accelerated seasoned equity offering if urban firms are experiencing a rise in value.

There is slightly less evidence that urban stocks lead rural stocks in the 1993–2002 subperiod. The coefficient of the rural stock return on the 1-day lagged urban stock return is a marginally significant 0.22 (t-statistic of 2.31). The p-value from the F-test is only 0.127.

It is interesting to speculate on why the coefficients on the previous day's urban stock returns are higher in the regressions with rural/small city stock returns as the dependent variable for 1973-1982 and 1983-1992 than for 1993-2002. It is certainly plausible that information was spread more quickly to rural/small city stocks in the latter period. The 1993-2002 subperiod saw the first use of the internet for transmitting investment information. This made financial reports and stock prices easily accessible to investors throughout the country.

It might be that the internet/lower communication costs have served to reduce the information differences between rural and urban locations by lessening the need to be physically located next to the firm to be able to collect information. Consistent with the notion that the cheaper communication costs has lowered the importance of location, Kim, Morse, and Zingales (2006) find that in academics, the competitive advantage in being physically located at an elite university has completely disappeared in the 1990s. They find that cheaper communication costs have reduced the importance of physical access to productive research colleagues. Arnold, Hersch, Mulherin, and Netter (1999) discuss how lower communication costs changed the role that regional stock markets play relative to the New York Stock Exchange.

4.2. Matched Market Value and Fama-French (1997) Industry Samples

One criticism of our Table 2 regressions might be that we are simply documenting that lower-market value stocks lag higher-market value firms. That is, firms located in rural/small city areas are on average smaller than urban stocks, so our evidence might be driven solely by firm size and not by the location of the firm's headquarters. A second criticism of our Table 2 regressions could be that we are combining stocks from numerous industries in our urban and non-urban portfolios. A more powerful test is to see whether if urban company stocks lead similar rural/small city company stocks after controlling for size and industry.

First, we create a matched sample of rural/small city and urban firms. We pair each urban firm with a rural/small city firm in the same Fama and French (1997) industry on the last trading day of each year during 1972-2001.[2] There are more rural/small city firms than urban firms, and they are allowed to be matched only once in a calendar year. Firms with a stock price lower than $5 as of the last trading day of the previous year are excluded from the matching procedure.

We first attempt to pair urban firms with rural/small city firms (in the same industry) within +/-3% of the urban firm's market value as of the last trading day of the prior year. If no firms in the same industry meet that criterion, we attempt to pair the firm using progressively wider market value screens of +/-6%, +/-9%, +/-12%, +/-15%, +/-18%, and finally +/-21%, always keeping the industry screen in place. Fifty percent of the matches occurred with the +/-

[2] Hou (2006) reports that controlling for industry using the Fama and French (1997) classifications is an important check when examining lead-lag patterns.

3% market value screen. Eighteen percent were paired with the +/-6% screen, 11% with the +/-9% screen, 8% with the +/-12% cutoff, and 13% with the higher market value ranges.

Over 78% of our urban firms are matched with a rural/small city company. Typically, the unmatched urban firms have either very high or very low market values. Even with the +/-21% market value range, there are not enough large or tiny rural/small city firms in the same industry groups to match with urban companies.

To cite an example, we can match fewer than 20% of all possible urban firms in the Shipbuilding and Railroad Equipment Industry with suitable rural/small city firms. The urban-based General Dynamics (named the Electric Boat Company before 1953) failed to be matched in every single year of the sample. There simply were not any large-capitalization shipbuilding companies based outside urban areas to be paired with the submarine-making General Dynamics.

On average, the market values for the two matched portfolios are almost identical throughout the time period. The average daily rural/small city portfolio market value is $686 million compared to $700 million for the matched urban sample. Over the 7,576 trading day period, there are 1,063.4 rural/small city firms and 1,045.6 urban firms on average in each portfolio. By design, both the rural/small city and urban portfolios have identical Fama-French (1997) industry concentrations.

Table 3 reports the regression results with urban portfolio returns (column 1) or rural/small city portfolio returns (column 2) as the dependent variable. Both urban and rural/small city size and industry matched-sample portfolios significantly lag day t-1 urban stock returns. When urban returns are the dependent variable, the coefficient on day t-1 urban returns is 0.46 (t-statistic of 5.17) compared to a coefficient of -0.23 (t-statistic of -2.11) on day t-1 rural/small city returns.

When rural/small city returns are the dependent variable, we see the same general pattern as before. That is, rural/small city stocks significantly lag the portfolio of urban returns (coefficient of 0.44 and t-statistic of 5.45). The prior day’s rural/small city return is negatively related to the rural/small city return. In both columns 1 and 2, there is some reversion in the portfolio returns. That is, the higher the previous day’s rural/small city returns, the lower the current day’s portfolio return using either the urban or rural/small city return.

For the three subperiods in columns 3-8, rural/small city stocks lag urban stocks across the board. As before, the effects are slightly stronger for the first two subperiods, but the coefficient on the lagged urban stock returns is still significant for the third period. Across all three time periods, the coefficient on the 1-day lagged rural/small city portfolio return is never statistically significant at the 5% level.

Since the matched-firm procedure results in rural/small city and urban portfolios with the same approximate market values and industry concentrations, our empirical evidence that urban stock returns lead non-urban stock returns is not caused simply by small-cap firms lagging large-cap firms. Nor are our empirical patterns caused by a failure to control for industry differences.

4.3. Matched Size, Analyst Coverage, and Fama-French (1997) Industry Samples

Brennan, Jegadeesh, and Swaminathan (1993) find that a different level of analyst coverage across stocks is strongly related to lead-lag stock return relation. Hence, differences in analyst coverage should be an important characteristic to control for in the analysis.

In Table 4, starting in 1976 (the first year of I/B/E/S data availability), we pair each urban firm with a rural/small city firm in the same Fama-French (1997) industry as well as similar size and analyst coverage. All firms with zero analyst coverage are removed from the analysis.

The analyst coverage may differ by at most one analyst. That is, an urban firm with 14 analysts covering the stock at the start of a calendar year can be paired only with a rural/small city company with 13, 14, or 15 analysts within the same Fama-French (1997) industry. As an example, for calendar year 1979, Philadelphia-based ARA Services in the Retail Industry is paired with rural-based Wal-Mart (headquartered in Arkansas). At the time, ARA Services (market value of $356 million) had 7 analysts covering the stock while Wal-Mart (market value of $339 million) had 8. Each urban and rural/small city daily return portfolio has, on average, approximately 670 firms, with an average firm market value of about $670 million, and coverage of 5.6 analysts.

The empirical lead-lag relationships remain robust even after controlling for size, industry, and analyst coverage.[3] The urban stock portfolio leads the rural/small city return portfolio. The highly significant coefficients on the 1-day lagged urban return are 0.37 and 0.38 when the dependent variable is the urban and rural/small city returns, respectively. In columns

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[3] Badrinath, Kale, and Noe (1995) examine information flow differences for heavily institutionally-traded stocks and firms held mainly by retail investors. In untabulated results, when we control for size and institutional holdings, our lead-lag return patterns remain robust.

3-8, five of the six 1-day lagged urban returns are positive and statistically significant while only one of the 1-day lagged rural returns is close to significant (t-statistic of -1.87).

4.4. Matched Market Value and Industry Samples using only Rural Firms

In a further robustness test, we create a matched sample of only urban and rural firms. That is, small city firms are removed from the sample. Firms are defined as rural if their headquarters are not within 100 miles of the center of a metropolitan area of 1 million or more people as defined by the 2000 census. By this definition, areas of the country that are classified as rural are in northern New England; Appalachia; most of the deep South; western, northern, and southern Texas; northern Minnesota and Wisconsin; the Great Plains states; parts of the Rocky Mountain states; much of non-coastal California; and all of Alaska and Hawaii.

Rural firms are, on average, smaller than either urban or small city firms, and there are substantially fewer of them. On average, there are about 270 urban and rural firms in the daily matched sample. The average market value is only about $440 million. Although the sample sizes are smaller in this table, we should see stronger results if information really does flow from urban to more remote areas. There may not be a substantial amount of information flowing between the same industry firms located in New York City and Atlanta, Georgia, but there should be huge potential information flows between firms located in New York City and Rapid City, South Dakota.

Table 5 reports regressions of the returns of the portfolios of all urban and rural stocks on the lagged returns of each portfolio. Results here are very clear. The coefficient on the urban portfolio's previous day's return is positive and highly significant for both the urban and rural portfolios. The returns of both the urban and the rural portfolio, however, are unrelated to prior returns on the rural portfolio. Urban stocks lead rural stocks.

It is interesting to note that the 1-day lagged urban coefficients are not statistically different between the early time period and the later period when rural returns are the dependent variable. Both coefficients have values of about 0.22 with t-statistics greater than 4.

4.5. Additional Robustness Tests

An additional robustness test uses monthly instead of daily returns to observe information flows. In untabulated results, we reran the regression of urban and rural/small city portfolios using monthly returns. The regression sample size drops from 7,571 daily observations to 355 monthly observations during the 1973-2002 time period. In none of the regressions using monthly returns are any of the urban or rural/small city coefficients statistically significant. This supports our use of daily returns to measure flows of information between different geographic areas. In our case, a multiple month lag in returns is too broad a measure to capture the relatively quick dissemination of information that appears to be occurring.

As a final check, we paired firms on the basis of +/- 3% of the prior day's trading volume as well as market value to gauge the strength of the findings. In untabulated results, the lead-lag results between urban and non-urban stocks continue to hold.

One potential problem with the trading volume matching procedure is that pairing on CRSP daily volume does not control for the time of day the last trade was executed. That is, two firms might have identical daily volume of 12,000 shares. One firm will have most of the volume at the market's close, while another firm will have all the trading volume within a half-hour of the opening bell. Hence, there is the possibility that staleness in prices will affect the lead-lag relationship. There is some recent evidence that indicates this may be a relatively minor concern. Using TAQ and mutual fund holdings data, Blume and Keim (2006) find that predictability in portfolio returns is due to stickiness or momentum in market returns and not due to stale prices.

4.6. Urgent and Time-Sensitive Trades

More direct evidence on where information is uncovered is obtained by examining individual trades in urban and rural/small city stocks. Investors who are trading on time-sensitive or short-lived information will attempt to trade large blocks as quickly as possible. We have noted that a high proportion of analysts and money managers are located in our urban areas. Investors can typically trade at least 1,000 shares at a time. Liquidity traders, on the other hand, can usually trade larger blocks at better prices if they do not have time-sensitive information and can take the time to negotiate trades. Hence, we use the proportion of 1,000 share trades relative to all trades, henceforth called urgent trades, as a proxy for informed trades.

Evidence that this is a useful proxy for informed trades comes from Harris and Schultz (1997). They show that prices of Nasdaq stocks move more following a trade for the quoted depth (usually 1,000 shares) than for either larger or smaller trades. Likewise, Battalio, Hatch, and Jennings (1997, p. 236) find that the presence of 1,000 share trades submitted through Nasdaq's Small Order Execution System (SOES) "concentrates the price discovery process." Similarly, Barclay and Warner (1993) find that most of the price runup prior to tender offer announcements comes from medium-sized trades, not the large or small ones. While 17.9% of trading volume is in trades of 1,000–1,900 shares in days –30 through –2 before tender offer announcements, 38.3% of the cumulative price change comes from these trades. At the same time, 24.4% of the volume is in trades of 10,000 or more shares, while only 9.5% of the cumulative price change comes from these trades.

Our proxy for informed trading should be particularly good for Nasdaq stocks. Nasdaq dealers in our sample have been required since 1993 to provide firm quotes for 1,000 shares for most stocks, so investors should expect to be able to trade that much. The quoted depth on the NYSE, however, can be misleading. In some cases, floor brokers may be working an order and will stand ready to trade, but the floor broker's interest will not be accurately reflected in quoted depth. In other cases, some limit orders may not be fully revealed in quotes. In either case, depth may be quite different from the quoted depth.

More important, Nasdaq trades can be executed quickly and automatically through the Small Order Execution System (SOES). Selectnet provided another electronic order routing system, but Selectnet orders were not executed automatically. On the NYSE, even orders submitted electronically are routed to the specialist, and this short delay may mean that the depth or price will change between order submission and execution.

We obtain all intraday quotes and trades for all Nasdaq traded urban and rural/small city stocks in our sample for 1993-1995 from the TAQ database. Quotes from other exchanges like the Chicago Stock Exchange or Pacific Stock Exchange are discarded.

Quoted depths are provided by TAQ, but Nasdaq depths are missing before April 1993. Since 1993, unless Nasdaq dealers are in the process of changing a quote, they are required to guarantee execution of one order of 1,000 shares at the quoted price. Smaller, less liquid stocks had mandated quote sizes of 200 or 500 shares. Quote sizes for Nasdaq stocks are assumed to be 1,000 shares before April 1993, unless a smaller quote size is used when TAQ begins providing quote sizes. In that case, the smaller quote size is assumed to prevail before April 1993.

Our measure of urgent trading for each stock is the percentage of all trades that were for 1,000 shares. For each month over 1993–1995, we run a cross-sectional Tobit regression with the percentage of trades that are informed as the dependent variable. Several explanatory variables are employed. Market value (in millions of dollars) is calculated for each stock as of the beginning of each month. The mean quote size is computed using the bid and ask depths at the time each trade took place. We also use, but do not report, 47 different Fama-French (1997) industry dummies in each regression.

The Tobit regressions are run separately for all stocks, for stocks with at least 25 trades during a month, for stocks with quote sizes of 1,000 shares, and for a subsample of only urban and rural firms. In all the analysis, we omit stocks with an average quote size of less than 500 shares.

Table 6 reports mean regression coefficients across the 36 months for each set of regressions. The t-statistics reported under the coefficients are Fama-MacBeth t-statistics calculated using the standard error of the 36 coefficients. The dummy variable for an urban location is positive and highly significant for all the regressions. After holding industry, market value, and other factors constant, stock of companies located in urban areas see significantly more urgent trading. When all Nasdaq stocks are included, an urban location means that an additional 1.86% of all trades are urgent. The Fama-MacBeth t-statistic of 23.11 indicates that an urban location is a highly significant determinant of the proportion of urgent trades.

It is worth noting that the coefficient on the mean quote size is also highly significant in all the regressions. This is consistent with the interpretation that urgent trades are motivated by short-lived information. Trading on information is only worthwhile if it occurs in sufficient size. It appears that information is impounded in prices of stocks with small quotes, like rural/small city stocks, through more restrained trading or through market maker observation of trading in other stocks.

When we restrict our sample to stocks with 25 or more trades during a month, Tobit results indicate that an additional 1.87% of urban firm trades are urgent. In this case, censoring is minimal with few firms having either 0% or 100% urgent trades. Similarly, when we restrict attention to stocks with quote sizes of 1,000 shares we find that a significantly higher proportion of trades are informed for stocks in urban areas. The last column of Table 6 reports that the results are even stronger when the sample is limited to only urban and rural stocks. That is, over 3% additional urban trades are urgent when the sample is restricted to only urban and rural firms.

Table 6 provides overall evidence that a higher proportion of the trades in urban stocks are urgent trades. One interpretation of urgency is that it arises because investors are trading on time-sensitive information. Sophisticated investors who can act quickly on information are likely to be located in an urban financial center. These investors are more likely to obtain information on nearby company stocks, perhaps because they know something about a firm's employees, suppliers, or customers. In addition, if information relevant to many companies becomes available, urban investors are likely to trade the stocks they are familiar with, the local urban stocks.

5. Conclusions

We use three recent findings about geography and investing to study how information is transmitted in the stock market. The first finding is that investors tend to hold the familiar stocks of local companies. Urban companies, which are local companies for many investors, are therefore likely to be the choice for most investors to trade in response to common information. The second finding is that investors appear to have an advantage in obtaining information about companies not very far from them (see Smith (1991)). Hence more information is likely to be revealed to more investors about urban firms than about other firms. The third is that urban stocks are more liquid than otherwise similar rural/small city stocks. All else equal, this will induce investors with common information to trade urban stock rather than non-urban stock. Hence we expect information to spread from urban to other stocks.

The data are consistent with this information diffusion proposition. We find that the returns of rural/small city stocks lag returns of urban stocks. This result holds after adjusting for differences in market values, analyst coverage, and industry composition. As expected, results are especially strong when the urban and rural/small city stocks are in the same Fama and French (1997) classified industry.

We also examine the characteristics of individual trades for urban and rural/small city stocks over 1993-1995. Traders with time-sensitive information will try to trade as much as possible as quickly as possible. That is, a trade will be for 1,000 shares, the typical depth on Nasdaq. We find a much higher proportion of trades for 1,000 shares for urban Nasdaq stocks than for non-urban Nasdaq stocks. In other words, a higher proportion of trades seem to be information-motivated for urban stock than for rural/small city stock. This is consistent with the idea that traders who have or at least think they have information will trade first in the firms they are familiar, the urban stocks.

At least two corporate finance implications can be obtained from our results. First, corporate share repurchases by non-urban based firms should not be delayed if the stock market is doing well. Since rural/small city firms lag the returns of urban companies, it would be better to immediately pursue open market repurchases of shares at a temporarily lower stock price. Second, rural and small city firms should delay an accelerated seasoned offering until after the stock market fully incorporates all information into their company's stock price. Thus, if similar urban-based firms are experiencing a sharp rise in value on a given day, it would be better for the rural firm to briefly delay the accelerated equity deal with an investment banker.

Our findings add to our understanding of how information is impounded in stock prices. Information, even when it is relevant for valuing many different stocks, seems to be uncovered through informal means more readily available to those who are physically near the companies. Conversations with employees, suppliers, and customers of a company may reveal significant information that is difficult for investors to uncover if they are far from a company. The role of these informal channels for information is a fruitful avenue for further research.

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Table 1
Daily average statistics by urban and rural/small city portfolios, 1973-2002

Item	Urban Firms (1)	Rural /Small City Firms (2)	Urban Firms (3)	Urban Firms (4)	Urban Firms (5)	Rural /Small City Firms (6)	Rural /Small City Firms (7)	Rural /Small City Firms (8)
Time Period	1973-2002	1973-2002	1973-1982	1983-1992	1993-2002	1973-1982	1983-1992	1993-2002
Mean Daily Stock Returns	0.055%	0.059%	0.059%	0.055%	0.052%	0.055%	0.068%	0.056%
Mean # of Firms	1,471.9	2,406.7	1,293.3	1,400.3	1,722.8	1,859.2	2,346.4	3,016.5
Market Value (in millions)	$1,321.6	$783.1	$383.0	$906.7	$2,679.4	$205.8	$517.1	$1,629.0
Number of Analysts	5.3	4.1	3.2	6.1	6.0	2.4	4.7	4.7
Nasdaq Proportion	46%	57%	33%	48%	57%	48%	60%	63%
Machinery Industry	3%	4%	4%	2%	3%	5%	4%	3%
Utility Industry	3%	6%	3%	4%	3%	7%	6%	4%
Business Services Industry	10%	5%	5%	10%	15%	2%	5%	8%
Retail Industry	5%	5%	6%	6%	4%	6%	5%	5%
Bank Industry	6%	8%	5%	6%	8%	3%	8%	13%
Trading Industry	8%	11%	6%	10%	7%	9%	14%	9%

A company is located in an urban area if the company headquarters is in the metropolitan area of New York City, Los Angeles, Chicago, Washington, San Francisco, Philadelphia, Boston, Detroit, Dallas, or Houston. A stock is located in a rural/ small city area if it is not in a top-ten metropolitan area. Fama-French (1997) industry classifications are used to define firm industry. Analyst coverage is from I/B/E/S and begins in 1976. There are 7,576 daily portfolio observations.

Table 2
Regressions of urban or rural/small city portfolio stock returns on lagged urban returns and lagged rural/small city returns, 1973-2002

	Dependent Variables							
Item	Urban Return (1)	Rural Return (2)	Urban Return (3)	Urban Return (4)	Urban Return (5)	Rural Return (6)	Rural Return (7)	Rural Return (8)
Time Period	1973-2002	1973-2002	1973-1982	1983-1992	1993-2002	1973-1982	1983-1992	1993-2002
Intercept	0.03	0.04	0.03	0.04	0.04	0.03	0.05	0.04
	(2.78)	(3.58)	(1.87)	(1.65)	(1.83)	(1.94)	(2.48)	(2.45)
$Urban_{t-1}$	0.47	0.28	0.83	0.91	0.45	0.65	0.84	0.22
	(4.51)	(3.37)	(4.46)	(3.78)	(3.46)	(4.24)	(4.05)	(2.31)
$Urban_{t-2}$	-0.08	-0.09	0.05	0.04	-0.11	0.03	0.00	-0.12
	(-0.82)	(-1.25)	(0.26)	(0.24)	(-0.85)	(0.23)	(0.01)	(-1.27)
$Urban_{t-3}$	0.04	0.00	-0.06	-0.04	-0.01	-0.05	-0.04	-0.04
	(0.38)	(0.05)	(-0.40)	(-0.31)	(-0.07)	(-0.43)	(-0.37)	(-0.48)
$Urban_{t-4}$	-0.01	-0.01	0.13	-0.08	0.06	0.10	-0.07	0.06
	(-0.07)	(-0.12)	(0.81)	(-0.55)	(0.42)	(0.80)	(-0.62)	(0.63)
$Urban_{t-5}$	-0.18	-0.16	-0.19	-0.03	-0.13	-0.19	-0.04	-0.11
	(-2.02)	(-2.49)	(-1.50)	(-0.19)	(-0.94)	(-1.86)	(-0.37)	(-1.16)
$Rural_{t-1}$	-0.27	-0.07	-0.57	-0.76	-0.37	-0.37	-0.69	-0.12
	(-1.91)	(-0.58)	(-2.32)	(-2.34)	(-2.09)	(-1.77)	(-2.47)	(-0.95)
$Rural_{t-2}$	0.07	0.10	-0.12	-0.02	0.10	-0.09	0.03	0.14
	(0.50)	(0.97)	(-0.52)	(-0.09)	(0.53)	(-0.47)	(0.16)	(1.05)
$Rural_{t-3}$	0.02	0.05	0.21	0.01	0.11	0.18	0.02	0.14
	(0.11)	(0.47)	(1.06)	(0.04)	(0.63)	(1.11)	(0.13)	(1.11)
$Rural_{t-4}$	0.07	0.06	-0.16	0.21	-0.03	-0.12	0.19	-0.05
	(0.51)	(0.57)	(-0.79)	(1.13)	(-0.16)	(-0.74)	(1.20)	(-0.39)
$Rural_{t-5}$	0.25	0.23	0.31	0.11	0.13	0.30	0.12	0.13
	(2.22)	(2.73)	(2.02)	(0.64)	(0.76)	(2.43)	(0.85)	(0.98)
P-Value $Urban_{t-1}$ $=Rural_{t-1}$	0.003	0.080	0.001	0.003	0.007	0.005	0.002	0.127
Obs.	7,571	7,571	2,522	2,529	2,520	2,522	2,529	2,520
R^2	0.08	0.09	0.14	0.12	0.04	0.19	0.14	0.04

A company is located in an urban area if the company headquarters is in the top-ten metropolitan areas of New York City, Los Angeles, Chicago, Washington, San Francisco, Philadelphia, Boston, Detroit, Dallas, or Houston. A stock is located in a rural/small city area if it is not within a top-ten metropolitan area. T-statistics (in parentheses) are calculated using White's (1980) heteroskedasticity-consistent method. P-values are from F-tests of the hypotheses that $Urban_{t-1}$ and $Rural/Small\ City_{t-1}$ coefficients are equal.

Urban (Rural/Small City) Portfolio $Return_t = a_0 + a_1 Urban\ Return_{t-1} + a_2 Urban\ Return_{t-2} + a_3 Urban\ Return_{t-3} + a_4 Urban\ Return_{t-4} + a_5 Urban\ Return_{t-5} + a_6 Rural/Small\ City\ Return_{t-1} + a_7 Rural/Small\ City\ Return_{t-2} + a_8 Rural/Small\ City\ Return_{t-3} + a_9 Rural/Small\ City\ Return_{t-4} + a_{10} Rural/Small\ City\ Return_{t-5} + e_i$

Table 3
Regressions of urban or rural/small city size and Fama-French (1997) industry-matched sample portfolio returns on lagged urban returns and lagged rural/small city returns, 1973-2002

	Dependent Variables							
Item	Urban Return (1)	Rural Return (2)	Urban Return (3)	Urban Return (4)	Urban Return (5)	Rural Return (6)	Rural Return (7)	Rural Return (8)
Time Period	1973-2002	1973-2002	1973-1982	1983-1992	1993-2002	1973-1982	1983-1992	1993-2002
Intercept	0.04	0.04	0.03	0.03	0.04	0.03	0.04	0.04
	(3.15)	(3.77)	(1.93)	(1.39)	(1.99)	(1.93)	(2.05)	(2.35)
$Urban_{t-1}$	0.46	0.44	0.49	0.53	0.39	0.42	0.58	0.36
	(5.17)	(5.45)	(3.78)	(3.20)	(2.78)	(3.80)	(3.72)	(2.90)
$Urban_{t-2}$	-0.08	-0.08	0.02	-0.17	-0.10	0.02	-0.13	-0.11
	(-0.95)	(-1.03)	(0.18)	(-0.91)	(-0.66)	(0.17)	(-0.77)	(-0.87)
$Urban_{t-3}$	-0.02	-0.02	-0.12	-0.15	0.06	-0.08	-0.17	0.05
	(-0.22)	(-0.31)	(-0.85)	(-1.13)	(0.40)	(-0.66)	(-1.42)	(0.40)
$Urban_{t-4}$	0.07	0.08	0.18	-0.02	0.20	0.18	-0.02	0.20
	(0.84)	(1.04)	(1.25)	(-0.17)	(1.43)	(1.53)	(-0.17)	(1.61)
$Urban_{t-5}$	-0.15	-0.16	-0.16	0.10	-0.27	-0.16	0.06	-0.26
	(-1.86)	(-2.22)	(-1.26)	(0.70)	(-1.84)	(-1.55)	(0.45)	(-2.03)
$Rural_{t-1}$	-0.23	-0.23	-0.13	-0.25	-0.25	-0.07	-0.32	-0.26
	(-2.11)	(-2.33)	(-0.84)	(-1.19)	(-1.57)	(-0.49)	(-1.62)	(-1.81)
$Rural_{t-2}$	0.06	0.07	-0.12	0.19	0.06	-0.09	0.15	0.08
	(0.58)	(0.75)	(-0.75)	(0.99)	(0.36)	(-0.68)	(0.86)	(0.58)
$Rural_{t-3}$	0.09	0.08	0.26	0.12	0.02	0.20	0.14	0.01
	(0.84)	(0.86)	(1.55)	(0.80)	(0.12)	(1.37)	(1.05)	(0.06)
$Rural_{t-4}$	-0.04	-0.04	-0.22	0.12	-0.19	-0.22	0.12	-0.19
	(-0.38)	(-0.50)	(-1.33)	(0.81)	(-1.26)	(-1.54)	(0.87)	(-1.41)
$Rural_{t-5}$	0.20	0.21	0.25	-0.03	0.28	0.25	0.00	0.27
	(2.20)	(2.56)	(1.82)	(-0.22)	(1.72)	(2.14)	(0.03)	(1.90)
P-Value $Urban_{t-1}$ $=Rural_{t-1}$	0.000	0.000	0.028	0.034	0.032	0.045	0.009	0.019
Obs.	7,571	7,571	2,522	2,529	2,520	2,522	2,529	2,520
R^2	0.08	0.08	0.15	0.12	0.04	0.18	0.12	0.03

At the start of each year, urban firms are matched with a rural/small city firm on the basis of market value and Fama-French's 48-industry classification. The daily rural/small city portfolio has an average market value of $686 million compared to the urban portfolio of $700 million. On average, the rural/small city portfolio holds 1,063.4 firms while the urban portfolio holds 1,045.6 firms. T-statistics (in parentheses) are calculated using White's (1980) heteroskedasticity-consistent method. P-values are from F-tests of the hypotheses that $Urban_{t-1}$ and Rural/Small $City_{t-1}$ coefficients are equal.

Urban (Rural/Small City) Portfolio $Return_t = a_0 + a_1 \text{Urban Return}_{t-1} + a_2 \text{Urban Return}_{t-2} + a_3 \text{Urban Return}_{t-3} + a_4 \text{Urban Return}_{t-4} + a_5 \text{Urban Return}_{t-5} + a_6 \text{Rural/Small City Return}_{t-1} + a_7 \text{Rural/Small City Return}_{t-2} + a_8 \text{Rural/Small City Return}_{t-3} + a_9 \text{Rural/Small City Return}_{t-4} + a_{10} \text{Rural/Small City Return}_{t-5} + e_i$

Table 4
Regressions of urban and rural/small city size and Fama-French (1997) industry-analyst matched sample portfolio returns on lagged returns, 1976-2002

	Dependent Variables							
Item	Urban Return (1)	Rural Return (2)	Urban Return (3)	Urban Return (4)	Urban Return (5)	Rural Return (6)	Rural Return (7)	Rural Return (8)
Time Period	1976-2002	1976-2002	1976-1982	1983-1992	1993-2002	1976-1982	1983-1992	1993-2002
Intercept	0.04	0.04	0.05	0.03	0.04	0.04	0.04	0.04
	(3.20)	(3.76)	(2.11)	(1.47)	(1.85)	(2.04)	(2.08)	(2.14)
$Urban_{t-1}$	0.37	0.38	0.32	0.54	0.23	0.28	0.55	0.28
	(4.57)	(5.27)	(2.94)	(3.58)	(1.78)	(2.99)	(4.14)	(2.35)
$Urban_{t-2}$	-0.03	-0.03	-0.01	-0.08	-0.07	-0.01	-0.07	-0.06
	(-0.40)	(-0.40)	(-0.05)	(-0.52)	(-0.52)	(-0.15)	(-0.53)	(-0.50)
$Urban_{t-3}$	-0.04	-0.04	0.06	-0.25	0.06	0.06	-0.22	0.05
	(-0.54)	(-0.54)	(0.41)	(-1.96)	(0.52)	(0.47)	(-1.94)	(0.43)
$Urban_{t-4}$	0.00	0.02	0.07	-0.07	0.11	0.09	-0.04	0.12
	(0.03)	(0.38)	(0.62)	(-0.64)	(0.85)	(0.95)	(-0.48)	(0.99)
$Urban_{t-5}$	-0.09	-0.09	-0.01	0.04	-0.27	-0.03	0.03	-0.26
	(-1.20)	(-1.36)	(-0.12)	(0.32)	(-2.07)	(-0.27)	(0.32)	(-2.15)
$Rural_{t-1}$	-0.16	-0.19	-0.03	-0.27	-0.07	0.02	-0.30	-0.14
	(-1.71)	(-2.29)	(-0.26)	(-1.48)	(-0.47)	(0.20)	(-1.87)	(-1.10)
$Rural_{t-2}$	0.01	0.01	-0.02	0.10	0.03	0.00	0.09	0.03
	(0.10)	(0.16)	(-0.13)	(0.70)	(0.21)	(0.00)	(0.74)	(0.20)
$Rural_{t-3}$	0.09	0.08	-0.01	0.23	0.01	-0.02	0.20	0.01
	(1.15)	(1.13)	(-0.07)	(1.98)	(0.09)	(-0.13)	(1.97)	(0.12)
$Rural_{t-4}$	0.04	0.01	-0.12	0.17	-0.09	-0.13	0.14	-0.10
	(0.45)	(0.18)	(-0.86)	(1.43)	(-0.62)	(-1.11)	(1.35)	(-0.74)
$Rural_{t-5}$	0.13	0.13	0.13	0.03	0.27	0.13	0.02	0.26
	(1.72)	(1.87)	(1.06)	(0.24)	(1.94)	(1.24)	(0.22)	(2.04)
P-Value $Urban_{t-1}$ $=Rural_{t-1}$	0.002	0.000	0.125	0.012	0.272	0.193	0.003	0.089
Obs.	6,560	6,560	1,511	2,529	2,520	1,511	2,529	2,520
R^2	0.06	0.07	0.09	0.12	0.04	0.13	0.13	0.03

At the start of each year starting in 1976, urban firms are matched with a rural/small city firm on the basis of market value, analyst coverage and Fama-French's 48-industry classification. The daily rural/small city portfolio has an average market value of $639 million and average analyst coverage of 5.6 compared to the urban portfolio of $697 million and 5.6 analysts. On average, the rural/small city portfolio holds 675.0 firms while the urban portfolio holds 667.3 firms. T-statistics (in parentheses) are calculated using White's (1980) heteroskedasticity-consistent method. P-values are from F-tests of the hypotheses that $Urban_{t-1}$ and Rural/Small $City_{t-1}$ coefficients are equal.

Urban (Rural/Small City) Portfolio $Return_t = a_0 + a_1 \text{Urban Return}_{t-1} + a_2 \text{Urban Return}_{t-2} + a_3 \text{Urban Return}_{t-3} + a_4 \text{Urban Return}_{t-4} + a_5 \text{Urban Return}_{t-5} + a_6 \text{Rural/Small City Return}_{t-1} + a_7 \text{Rural/Small City Return}_{t-2} + a_8 \text{Rural/Small City Return}_{t-3} + a_9 \text{Rural/Small City Return}_{t-4} + a_{10} \text{Rural/Small City Return}_{t-5} + e_i$

Table 5

Regressions of urban or rural size and Fama-French (1997) industry-matched sample portfolio returns on lagged urban returns and lagged rural returns, 1973-2002

	Dependent Variables							
Item	Urban Return (1)	Rural Return (2)	Urban Return (3)	Urban Return (4)	Urban Return (5)	Rural Return (6)	Rural Return (7)	Rural Return (8)
Time Period	1973-2002	1973-2002	1973-1982	1983-1992	1993-2002	1973-1982	1983-1992	1993-2002
Intercept	0.04	0.04	0.03	0.03	0.05	0.02	0.05	0.05
	(3.63)	(4.78)	(2.15)	(1.30)	(2.97)	(1.80)	(2.61)	(3.68)
$Urban_{t-1}$	0.26	0.28	0.26	0.30	0.17	0.23	0.36	0.22
	(6.51)	(8.59)	(4.29)	(4.01)	(2.60)	(4.52)	(6.03)	(4.02)
$Urban_{t-2}$	0.00	0.01	0.02	0.04	-0.05	0.04	0.04	-0.04
	(0.08)	(0.22)	(0.31)	(0.62)	(-0.76)	(0.76)	(0.68)	(-0.85)
$Urban_{t-3}$	0.03	0.02	-0.01	-0.02	0.11	-0.00	-0.01	0.07
	(0.70)	(0.53)	(-0.13)	(-0.22)	(1.76)	(-0.08)	(-0.18)	(1.19)
$Urban_{t-4}$	0.00	0.00	0.00	0.02	0.03	0.00	0.01	0.03
	(0.10)	(0.01)	(0.03)	(0.35)	(0.42)	(0.08)	(0.19)	(0.55)
$Urban_{t-5}$	0.01	-0.01	0.01	0.03	-0.04	-0.01	0.01	-0.05
	(0.21)	(-0.45)	(0.12)	(0.57)	(-0.63)	(-0.22)	(0.21)	(-0.92)
$Rural_{t-1}$	0.02	-0.06	0.14	-0.01	0.01	0.15	-0.15	-0.12
	(0.50)	(-1.55)	(1.78)	(-0.12)	(0.19)	(2.18)	(-1.61)	(-1.91)
$Rural_{t-2}$	-0.04	-0.03	-0.14	-0.06	0.03	-0.14	-0.03	0.04
	(-0.97)	(-0.77)	(-1.95)	(-0.53)	(0.46)	(-2.25)	(-0.42)	(0.60)
$Rural_{t-3}$	0.05	0.05	0.16	0.01	-0.02	0.12	0.01	0.01
	(1.23)	(1.35)	(2.06)	(0.08)	(-0.26)	(1.82)	(0.17)	(0.21)
$Rural_{t-4}$	0.02	0.03	-0.03	0.08	-0.03	-0.01	0.08	-0.02
	(0.53)	(0.85)	(-0.37)	(0.95)	(-0.43)	(-0.22)	(1.17)	(-0.30)
$Rural_{t-5}$	0.05	0.06	0.08	0.07	0.04	0.08	0.06	0.05
	(1.27)	(1.71)	(1.12)	(1.06)	(0.54)	(1.34)	(1.11)	(0.74)
P-Value $Urban_{t-1}$ $=Rural_{t-1}$	0.005	0.000	0.386	0.070	0.245	0.488	0.000	0.003
Obs.	7,571	7,571	2,522	2,529	2,520	2,522	2,529	2,520
R^2	0.09	0.09	0.15	0.11	0.04	0.17	0.13	0.03

At the start of each year, rural firms are matched with an urban firm on the basis of market value and Fama-French's 48-industry classification. A stock is located in a rural area if it is not within 100 miles of the center of a metropolitan area of 1 million or more people as defined by the 200 census. Firms located in small cities are excluded from this table. The daily rural portfolio has an average market value of $438 million compared to the urban portfolio of $441 million. On average, the rural portfolio holds 275.0 firms while the urban portfolio holds 269.4 firms. T-statistics (in parentheses) are calculated using White's (1980) heteroskedasticity-consistent method. P-values are from F-tests of the hypotheses that $Urban_{t-1}$ and $Rural_{t-1}$ coefficients are equal.

$$\text{Urban (Rural) Portfolio Return}_t = a_0 + a_1\text{Urban Return}_{t-1} + a_2\text{Urban Return}_{t-2} + a_3\text{Urban Return}_{t-3} + a_4\text{Urban Return}_{t-4} + a_5\text{Urban Return}_{t-5} + a_6\text{Rural Return}_{t-1} + a_7\text{Rural Return}_{t-2} + a_8\text{Rural Return}_{t-3} + a_9\text{Rural Return}_{t-4} + a_{10}\text{Rural Return}_{t-5} + e_i$$

Table 6
Proportion of informed trading for urban and rural/small city Nasdaq stocks, 1993-1995

	Tobit	Tobit	Tobit	Tobit
	All Stocks	Stocks with 25+ Trades in Month	Quote Size of 1,000 Shares	Only Urban and Rural Firms
Intercept	6.46	10.37	15.72	4.34
	(10.20)	(11.50)	(15.74)	(4.33)
Urban Dummy	1.86	1.87	1.92	3.05
	(23.11)	(25.07)	(18.40)	(25.68)
Mean Quote Size (000s)	10.88	7.85		11.35
	(17.62)	(18.78)		(17.34)
Log (Market Value)	0.34	0.24	0.81	0.59
	(1.49)	(1.03)	(3.16)	(2.50)
Fama-French Industry Dummies	Yes	Yes	Yes	Yes
Mean Observations	2,785	2,558	1,656	1,211
Percent Censored	3.72%	0.01%	0.01%	3.57%

Tobit regressions are run with the percentage of volume from informed trades as the dependent variable each month. The dependent variable is censored at zero and one. Independent variables include a dummy for urban stocks, the mean depth, the log of market value, and dummies for Fama-French (1997) industries for each month over 1993-1995. A trade is defined as informed if it is for 1,000 shares. The percentage of informed trades is obtained by dividing the number of informed trades during the month by the total number of trades. Market value is measured as of the beginning of each month (in millions of dollars). The urban dummy takes the value of one if the firm's headquarters are in one of the ten most populous metropolitan areas of the United States in 2000, else zero. Forty-seven different Fama and French (1997) industry dummies are included in all the regressions but are not reported in the table to save space. Mean coefficients across the 36 monthly Tobit regressions are reported along with Fama-MacBeth t-statistics for the coefficients. Stocks with mean quote sizes of less than 500 shares are omitted.