Liquidity: Urban Versus Rural Firms

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Abstract: Our paper examines the impact of geographic location on liquidity for U.S. rural- and urban-based companies. Even after adjusting for size and other factors, rural firms trade much less, are covered by fewer analysts, and are owned by fewer institutions than urban firms. Trading costs are higher for rural Nasdaq firms, and volume that can be attributed to marketwide factors is lower for rural stocks. The findings add to our understanding of the way that access to information and familiarity affect liquidity.

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1. Introduction

The finance literature increasingly emphasizes the importance of geographic location in financial decisions. Coval and Moskowitz (1999), Grinblatt and Keloharju (2001), Huberman (2001), Zhu (2002), Ivkovic and Weisbenner (2004), and Loughran and Schultz (2004) demonstrate that investors disproportionately own and trade the stocks of firms located nearby. Our paper contributes to the literature by exploring the effect of a firm's geographic location on liquidity. We hypothesize that it is more difficult to obtain information on firms based in remote, rural locations than on firms based in large metropolitan areas. Furthermore, rural firms are likely to be familiar to fewer investors. As a result, rural stocks are likely to be less liquid than their urban counterparts.

Several findings confirm these conjectures. First, rural stocks seem to capture less attention from the investment community. After adjusting for capitalization, industry, S&P 500 listing, and other factors, we show that rural stocks attract less analyst coverage than urban stocks. Likewise, all else equal, institutions own significantly lower proportions of the outstanding shares of rural stocks than urban stocks.

Second, rural stocks trade much less than urban stocks. We calculate turnover, defined as the proportion of a firm's shares that trade every day, for individual urban and rural stocks over 1983-2002. Turnover rates are about 50% higher for urban stocks than rural stocks. After adjustment for differences in capitalization, industry, analyst coverage, and stock price, turnover remains much higher for urban than rural stocks. This result holds for large and small stocks, for Nasdaq and NYSE/Amex stocks, and for different subperiods. The nature of the trading moreover is different for urban and rural stocks. Turnover of individual urban stocks closely mirrors turnover for the market as a whole. Rural stock turnover has a larger unsystematic component and is not as closely related to marketwide turnover.

Third, trading costs for Nasdaq stocks are higher if they are based in rural areas than if they are located in large cities. Quoted spreads and effective spreads over 1993-

1995 for all trade sizes are higher for rural Nasdaq stocks than urban Nasdaq stocks. The difference in trading costs remains highly significant after adjusting for differences in capitalization, analyst coverage, stock price, and industry.

While these findings are interesting in their own right, we think their importance lies in what they tell us about the way that both access to information and familiarity affect liquidity. Some research reports that both individual investors and institutions earn significantly higher returns on their local investments than on their positions in stocks in distant companies. Hence superior access to information seems to be one reason investors are biased toward local firms. Other studies suggest investors buy stocks because they are familiar with a company. Local stocks are more likely to be familiar to investors.

Our urban stocks are based in cities with many investors. They are thus “local stocks” for many people and familiar to many potential investors. Informal sources of information about local companies, such as conversations with employees and customers, are available to many potential traders and investors. Likewise, local media coverage of local companies reaches many investors in urban areas. Our urban areas also tend to have high concentrations of institutional investors, brokers, and investment bankers. We would expect these sophisticated investors to be adept at uncovering and interpreting information, and also expect that they are especially likely to acquire information on local stocks. It is also likely that they trade stocks that they know and own – which will tend to be locally based stocks.

We find that differences in liquidity between urban and rural firms are greater if the firms trade on Nasdaq than if they are listed on the NYSE or Amex. We explore two possible explanations for this finding. First, there are structural differences in the two markets. All NYSE/Amex stocks have one specialist while the number of Nasdaq market makers varies across stocks. Consistent with this, we find that all else equal, rural Nasdaq stocks attract significantly fewer market makers. A second explanation is that NYSE or Amex listing may increase the visibility of rural firms. Evidence that supports this conjecture is that turnover increases for rural firms relative to urban firms after the firm moves from Nasdaq to either the NYSE or Amex.

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.

Empirical results on turnover, location, and trading costs are in Section 4. We conclude in Section 5.

2. Hypotheses and literature review

2.1 Location and portfolio holdings

It is well established that investor portfolio holdings are biased toward domestic firms and away from foreign firms. Recent research shows that even when they choose among domestic stocks, investors prefer to hold firms that are located nearby. 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 1,814 kilometers from potential holdings, but only 1,654 kilometers from the companies they actually held in their portfolios. As Coval and Moskowitz explain it, one of every ten companies in a fund manager's portfolio is chosen because it is located in the same city as the manager.

Individual investors are even more biased than fund managers toward local companies. Ivkovic and Weisbenner (2004) examine the stock investments of over 30,000 households in the continental United States from 1991 through 1996. They define companies with headquarters within 250 miles of an investor as "local" stocks for that investor. The average household invests 31% of its portfolio in local stocks, according to this measure. If investors had held the market portfolio instead, on average only 13% of their investments would be in local stocks.

Trading, like ownership, is concentrated in local stocks. Loughran and Schultz (2004) examine trading for portfolios of Nasdaq stocks based in 25 U.S. cities. They produce three pieces of evidence of a local bias in stock trading. First, trading volume of west coast companies is lower than trading volume of east coast firms in the morning. An obvious explanation for this is that investors in the west, who trade west coast stocks, are still in bed or on their way to work at that time. The differences in intraday volume patterns are unlikely to be a result of differences in the timing of information releases as Loughran and Schultz use only stocks with no change in the inside bid and ask over the day. Second, they show that trading volume drops significantly for stocks based in cities that experience blizzards. Finally, they show that while stock market volume as a whole declines on the Jewish holiday of Yom Kippur, the fall is especially large for companies based in cities with large Jewish populations.

While a preference for investing in local companies seems universal, there is some evidence that it is particularly strong in remote areas. Grinblatt and Keloharju (2001) study patterns of stock ownership for Finnish companies. Helsinki, the capital of Finland, is by far its largest city, and about two-thirds of Finnish firms are located there. Investors who live in other areas of Finland have a particularly strong bias toward holding local stocks; this holds for both individuals and institutions.

While people who live in rural areas are particularly likely to invest in local stocks, as a rule they are less likely to own stocks. Hong, Kubik, and Stein (2004) use data from the Health and Retirement Survey of 7,500 households in 1992 to examine influences on stock market participation. After adjustment for wealth, education, race, and other factors, investors who live in urban areas are about 5% more likely to own stock than rural residents.

2.2 Location and information

Why do investors prefer local stocks? One explanation is that they have advantages in obtaining information on local stocks. Ivkovic and Weisbenner (2004) report that retail investors earn 3.7% more per year on local stocks than on their other investments. The difference between returns on local stocks and others is even higher, about 6%, when only non-S&P 500 index stocks are considered. Ivkovic and Weisbenner find that the difference in returns between local stocks and others appears for investors all over the country and is robust to various risk adjustments. Bodnaruk (2003) uses data on Swedish investors' stockholdings and home postal codes for every six months during 1995-2001. After controlling for size, book-to-market, and industry, he estimates that an investor who purchases shares of companies 100 kilometers away earns between 1.8% and 3.8% less per year than an investor who buys stock in firms only 10 kilometers away.

Mutual funds also appear to earn significantly higher returns on their local-firm holdings than on their distant-firm holdings. Coval and Moskowitz (2001) separate mutual fund holdings into local and distant stocks, where local stocks are those with headquarters within 100 kilometers of the mutual fund. Local stocks that are held by funds earn annual returns that are about 3% higher on average than local stocks that are not held by funds. Interestingly, all else equal, funds tend to turn over local stocks less frequently than stocks of distant companies. Locally held firms tend to be small and highly levered. Coval and Moskowitz suggest that these are the sorts of stocks in which local investors may have an information advantage.

Other evidence that closeness to a company provides information advantages comes from work on equity analysts by Malloy (2004). He finds analysts located nearer a company's headquarters provide more accurate earnings forecasts. Greater accuracy is not explained by underwriting relationships between the analyst's firm and the company analyzed. Enhanced accuracy of local forecasts is particularly strong for firms located in remote areas, for small firms, and for high book-to-market firms. Stock price responses to analyst rating changes are especially strong for analysts located near a particular firm.

2.3 Familiarity, awareness, and local bias

A second explanation for investor preference for local stocks is simply awareness. Barber and Odean (2003) observe that with more than 7,000 U.S. stocks to consider, investors cannot consider all securities in their investment decisions. They instead choose among stocks that have captured their attention. The role of attention is particularly important in buy decisions. Investors own a small number of stocks they might sell, but can choose among thousands of possible stocks to buy. Consistent with this is Barber and Odean's finding that individual investors are net buyers of stocks that are in the news.

Huberman (2001) shows that customers of the regional Bell operating companies are much more likely to buy the telephone company providing their service than another telephone company. He argues that this reflects investors' tendency to invest in the familiar, rather than ease of obtaining information on local companies. Superior information can just as well mean that local investors will avoid or sell local companies.

Huberman finds, however, that investors in every state overweight their portfolio in the local regional Bell operating company.

Zhu (2002) uses data from a large U.S. brokerage firm to explore the local bias of individual investors. He finds that company advertising expenditures mitigate the local bias. Like Huberman (2001), Zhu concludes that familiarity accounts for individuals' preference for local firms.

2.4 Information and liquidity

The research to date shows that investors disproportionately hold and trade stocks of local companies. It appears that the local bias arises both because investors have better access to information on local companies and because investors trade securities that are familiar to them. To us, these findings suggest that location may be an important factor in determining liquidity. Stocks of companies that are based in large urban areas will be local stocks to a large number of investors. As a result, more investors will have access to information on them and they will be familiar to more investors than similar stocks from rural areas.

While we are the first to test whether location affects liquidity, others have looked at how familiarity and ease of acquiring information on securities affects liquidity. Frieder and Subrahmanyam (2003) show that individual investors disproportionately hold firms with greater brand visibility. Grullon, Kanatas, and Weston (2003) hypothesize that product market advertising may increase investor awareness of a company. They show that firms that advertise more have more shareholders and more institutional shareholders than firms with similar market values. Quoted and relative bid-ask spreads also decline with advertising expenditures.

By analogy, we also expect trading costs to be lower for urban stocks. Like stocks of firms that advertise heavily, stocks of urban firms are likely to be familiar to many investors. Greater familiarity to more investors also implies more trading and more rapid turnover for urban stocks. Of course, trading costs and turnover are not independent effects. Higher turnover will lower trading costs just as lower trading costs can increase trading.

3. Data and methodology

To classify stocks as urban or rural, we follow a number of authors, including Coval and Moskowitz (1999), Zhu (2002), Ivkovic and Weisbenner (2004), Loughran and Schultz (2004), and Malloy (2004), and use a company's headquarters as a proxy for its location. We obtain the headquarters locations for companies from Compustat, Nasdaq, and Moody's. A stock is defined as an urban stock if the company headquarters is in one of the ten largest metropolitan areas of the United States according to the 2000 census. These include New York City, Los Angeles, Chicago, Washington-Baltimore, San Francisco, Philadelphia, Boston, Detroit, Dallas, and Houston. Companies located in a suburb of one of these cities are also included in the urban portfolio. Thus, companies based in Skokie, Illinois, a suburb of Chicago, or Hoboken, New Jersey, a suburb of New York City, are included in the urban portfolio.

A company is defined as rural if its headquarters is 100 miles or more from the center of any of the 49 U.S. metropolitan areas of 1 million or more people according to the 2000 census.[1] Areas of the country that we classify as rural are shaded in Figure 1. Rural companies are located in parts of New England and upstate New York; Appalachia; most of Alabama, Mississippi, and Arkansas; western and southern Texas; parts of Georgia and South Carolina; northern Minnesota and Wisconsin; the Great Plains states; parts of the Rocky Mountain states; eastern Washington and Oregon; and all of Alaska and Hawaii.

This leaves many stocks unclassified as either urban or rural by our definitions. These firms are excluded from our analysis. So, for example, firms headquartered within 100 miles of Kansas City are dropped from the sample.

There is an element of arbitrariness in our definitions of urban and rural locations. One could argue that companies located in Minneapolis or Denver should be included in our portfolio of urban stocks. Alternatively, one could argue that more firms should be included in our rural portfolio. Companies located in most of Kentucky are excluded, for

[1] An alternative approach is that of Hou and Moskowitz (2004), who measure the remoteness of a firm by calculating the average airfare and distance from all airports to a firm's headquarters.

example, because they are within 100 miles of Louisville, Cincinnati, or Nashville. Nevertheless, we believe our definitions provide useful samples of clearly urban and clearly rural stocks.

The University of Chicago's Center for Research in Security Prices (CRSP) provides the stock returns, trading volume, SIC classifications, shares outstanding, and share price information for the sample. Analyst coverage data are obtained from Institutional Brokers Estimate System (I/B/E/S). Analyst coverage is defined as the number of analysts reporting current fiscal year annual earning estimates each month. Compustat provides the number of employees and shareholders. The number of shareholders could be viewed as a proxy for investor attention or recognition. Intraday spread and trade size data are provided by the New York Stock Exchange's Trade and Quote (TAQ) dataset.

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 the firm to have a stock price of at least $5 two days before entering the sample for any particular trading day.

4. Sample Characteristics and Results

Table 1 reports summary statistics for the rural and urban samples. Over 1976-2002, there are 6,818 trading days. We start the analysis in 1976 because this coincides with the first availability of the I/B/E/S data set. For each trading day, a portfolio of rural and urban stocks is created. Firms need to be located in either a rural or an urban location, and 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 388.5 rural firms and 1,501.4 urban firms in the daily portfolios. The average daily return of the rural portfolio is 0.073% during the sample period, and the average daily urban return is 0.066%. Even with over 6,800 trading days, a test for a difference in mean returns produces a t-statistic of only 1.51.

Hence, the average daily return does not differ significantly between rural and urban geographic areas.[2]

Table 1 also reports that a higher percentage of urban firms than rural firms are listed on the NYSE or the Amex. Rural stocks list more frequently on Nasdaq, and have lower market values (shares outstanding multiplied by stock price) and turnover (daily trading volume divided by shares outstanding) than urban stocks. Note that there is a fundamental difference in the way Nasdaq and NYSE volumes are calculated. Much of the NYSE volume consists of a public market order executing against a public limit order. Thus 100 shares bought by the public and 100 shares sold by the public results in volume of 100 shares. On Nasdaq during this time, both buy and sell orders executed against dealer quotes. In this case, 100 shares bought by the public and 100 shares sold by the public result in a volume of 200 shares. For this reason, we separate Nasdaq and listed firms in some of the analysis. When we make cross-exchange comparisons, we double the volume for all NYSE and Amex firms to make the comparisons more meaningful.[3]

Industry composition also differs between urban and rural stocks. Table 1 reports the percentage of rural and urban firms in the manufacturing, banking, transportation, and mining industries. Manufacturing is defined as a two-digit SIC code of 20-39, banking or finance by SIC codes between 60-67, transportation by SIC codes 40-49, and mining by SIC codes 10-14. Together these four industries account for 82% of rural firms and 71% of urban firms. Banking, transportation, and mining companies account for a greater portion of rural than urban firms. Manufacturing firms are a greater proportion of the urban stocks.

We obtain insider and institutional holdings for 1988–2002 from Compact Disclosure. Surprisingly, insiders hold a lower proportion of the total shares outstanding

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[2] Our paper does not analyze the long-run return performance of the rural and urban samples. However, Hou and Moskowitz (2004) show that delayed response firms, which are likely to include our rural stocks, command a return premium of 12% per year. Their delayed response firms are small, have high book-to-market ratios, are neglected by analysts and large institutions, and are more volatile than firms that respond quickly to information. Interestingly, Hou and Moskowitz find that proxies for investor recognition (i.e., analyst coverage and remoteness) seem to drive their documented risk premium. Hou (2003) finds that the intra-industry lead-lag effect is caused primarily by sluggish market response to negative information.

[3] This adjustment has been used in papers that make direct comparisons between NYSE and Nasdaq volume (e.g. LaPlante and Muscarella (1997)). Barclay (1997) compares 60-day windows before and after 472 stocks moved from Nasdaq to the NYSE and reports that volume after listing averaged 52% of volume before listing. For his sample, the heuristic of multiplying NYSE/Amex volume by two produces almost exactly correct results.

in rural firms than urban firms. Institutions also hold a greater portion of the shares in urban stocks than in rural stocks. Thus small, retail investors own a higher portion of the shares of rural stocks than urban stocks.

Analyst coverage is another characteristic that differs between firms in the two U.S. geographic areas. Malloy (2004) finds that fewer analysts cover rural firms than urban firms. Similarly, we find that on average 3.4 analysts cover rural firms in our sample while on average of 5.3 analysts cover urban firms. Firms not listed on I/B/E/S are assumed to have zero analysts. Not surprisingly, urban firms are much more likely to be listed on the S&P 500 Index than rural firms. On average, 14% of urban firms are in the index compared to about 6% for rural stocks.

Table 1 also sorts the sample by relative market value. In a given year, firms with a market value higher than or equal to the median NYSE firm are defined as large, while firms with a market value below the median NYSE value are defined as small. Columns 3 and 4 report the characteristics of small-market capitalization firms in rural and urban areas. Both samples report similar realized returns, but the average urban small firm is tilted more toward the NYSE/Amex, higher market value, more analyst coverage, fewer shareholders, a higher percentage listed on the S&P 500, and greater turnover than the average rural small firm.

Columns 5 and 6 of Table 1 report that for firms at least as large as the median NYSE stock, both urban and rural portfolios report similar returns and proportions listed on the three U.S. stock exchanges. The urban large-firm portfolio also reports higher market values, more analyst coverage, more employees, more shareholders, a higher percentage listed on the S&P 500, and higher institutional holdings and trading volume turnover than the rural large-firm portfolio. On average, there are 73.5 large rural firms compared to 423.8 large urban firms in the daily sample.

4.1 Analyst coverage for urban and rural stocks

There are good reasons to expect rural firms to attract less analyst coverage. First, analysts, like investors, may be less aware of companies based in rural areas. Second, it is more expensive for analysts to cover companies in remote areas. An analyst based in

New York can easily fly to Philadelphia to meet with a company's management or tour their facilities. Flying to Sioux City, Iowa, on the other hand, is likely to involve multiple flights and layovers. Once the analyst gets there, it is unlikely there are other firms in the area to visit. Consistent with this conjecture, we find that in every month during our time period, more analysts cover urban firms than rural firms.

Urban and rural firms, however, differ on several dimensions such as market capitalization, S&P listing, and industry concentration. To see if analyst coverage of urban and rural firms differs after we control for these dissimilarities, we regress the number of analysts following a stock on a dummy for a rural location, the market value and log of market value of the company, industry dummies, log(number of employees), log(number of shareholders), an S&P 500 Index dummy, and a dummy for Nasdaq listing. In these regressions, firms not listed on I/B/E/S are assigned a zero value for the number of analysts.

We run separate regressions for each of the 324 months over 1976-2002. We then calculate time-series averages of the coefficients from the monthly regressions. To calculate the standard errors of the coefficients, we estimate the standard deviation of the 324 coefficients and adjust for autocorrelation assuming the coefficients follow an AR(1) process. That is, with T regressions, the standard error of the coefficient α_i is

$$SE(\alpha_i) = \frac{\sigma(\alpha_i)}{\sqrt{T}}\sqrt{\frac{1+\rho}{1-\rho}} \qquad (1)$$

where ρ is the first-order autocorrelation of the coefficient estimates. This approach of running cross-sectional regressions and then testing whether the mean coefficient differs from zero is from Fama and MacBeth (1973). We refer to t-statistics calculated in this way as Fama-MacBeth t-statistics. The adjustment for autocorrelation in (1) is suggested by Cochrane (2001).

Panel A of Table 2 reports results using the number of analysts as the dependent variable. The first regression includes all stocks. The coefficient on the rural dummy variable is –0.32, with an autocorrelation-adjusted Fama-MacBeth t-statistic of –3.19. So, in other words, after adjusting for capitalization, industry differences, and other factors, 0.32 fewer analysts cover rural firms than similar urban firms.[4] When we split the sample into firms that are below and above the median NYSE capitalization, we get similar results for both groups. Small rural firms attract 0.11 fewer analysts than their urban counterparts. Large rural firms average 0.47 fewer analysts than similar urban firms. Being listed on the S&P 500 Index has a strong impact, adding 3.1 more analysts for firms larger than the median NYSE stock.

4.2 Institutional holdings of urban and rural firms

There are several reasons to expect institutions to invest less in rural companies. First, institutions may simply be less aware of rural firms. Institutional investors are typically located in large cities and tend to overweight their portfolios toward stocks of companies located nearby (see Coval and Moskowitz, 1999). Also, institutional investors, like analysts, will find it expensive in terms of time and money to visit companies farther away. We have data on institutional holdings for 177 months from April 1988 through December 2002. Table 1 reports that on average institutions hold 26.5% of shares in rural stocks compared to 37.1% of shares in urban stocks.

To adjust for other differences in the urban and rural stocks, we regress institutional holdings on a rural dummy, the market value and log of market value, industry dummies, log(number of employees), log(number of shareholders), an S&P 500 Index dummy, and a dummy for Nasdaq listing for each of the 177 months. We then calculate a time series average of the coefficients and autocorrelation-adjusted Fama-MacBeth t-statistics as before. Results are reported in Panel B of Table 2.

The first row of Panel B reports average coefficients across the 177 regressions when all firms are included. Not surprisingly, we find that firm size and industry are important determinants of institutional holdings. For us, the most interesting result is that the mean coefficient on the rural dummy is –4.37, implying that institutions hold 4.4% less of a firm's stock if it is located in a rural area. The Fama-MacBeth t-statistic is –10.06, indicating that a rural location is a highly significant determinant of institutional

[4] If the same regression was run using only firms with a non-zero number of analysts, the average coefficient on the rural dummy increase to -0.47 (Fama-MacBeth t-statistic of -2.58).

holdings. The next two rows of Panel B report average coefficients when the regressions are run separately for small and large firms. In both cases, the dummy variable for a rural location is negative and highly significant. For large firms, a rural location lowers the level of institutional holdings by 6.98% compared to similar firms located in urban areas.

4.3 Turnover for urban and rural stocks

In Table 1 we report that turnover is much lower for rural than urban stocks. Is this because rural firms are less visible and less liquid as a result of their location, or is the difference in turnover explained by differences in the characteristics of the firms?

For each of the 3,722 trading days over 1988–2002, we regress individual firm turnover on a dummy variable for a rural location, the market capitalization and log of market capitalization, the number of analysts covering the stock, the proportion of shares held by insiders and by institutions, the inverse of the stock price as a proxy for trading costs, four industry dummies, log(number of employees), log(number of shareholders), an S&P 500 Index dummy, and a Nasdaq dummy variable. When both Nasdaq and NYSE/Amex firms are used in the same regression, we include a dummy variable for Nasdaq stocks and double NYSE/Amex turnover to account for differences in the way volume is calculated. We then calculate the time-series average of the coefficients across the daily regressions and the autocorrelation-adjusted Fama-MacBeth t-statistics. In this case, with daily regressions, we use an AR(20) adjustment for the standard errors. We use 20 days because this corresponds roughly to a month of trading, the lag we impose on the other regressions in the paper.

Intercepts and the four industry dummies are included in the regressions, but not reported in the table to save space. We include firms with a turnover of zero (i.e., the stock did not trade in a given day) in the regressions. Table 3 reports the regression results.

The first row of Table 3 reports average coefficients from the regressions that include all stocks and a dummy for Nasdaq listing. The mean coefficient on the rural dummy is –0.17. In other words, all else equal, rural firms' daily volume is lower by

0.17% of their outstanding shares. The Fama-MacBeth autocorrelation-adjusted t-statistic is –11.04 for the rural dummy.

Other coefficients are mostly as expected. Turnover increases with analyst coverage. It is not clear if this is because analysts are more likely to cover heavily traded stocks, or because investors are more likely to trade stocks that are covered by analysts. The coefficient on insider holdings is negative and highly significant. We expect insiders to hold onto their shares, perhaps to maintain control of the company; hence it is not surprising that firms with large insider holdings are not traded as much as others.

The next column reports that turnover increases with institutional holdings. Institutions as a rule turn over their portfolios more rapidly than individuals, so it is not surprising that stocks with heavy institutional ownership turn over more rapidly than other stocks. The inverse of the stock price is intended to proxy for trading costs.[5] Hence we expect to find, as we do, that turnover declines with the stock price inverse. The negative coefficient on the S&P 500 dummy is somewhat surprising, but could reflect its correlation with firm size and institutional holding. When the S&P 500 dummy is the only independent variable, the average coefficient is 0.14 (Fama-MacBeth t-statistics of 4.23). The coefficient on the Nasdaq dummy is 0.16 and highly significant. Nasdaq stocks trade more even after doubling NYSE/Amex volume to make them comparable. Even after adjustment for all these factors, rural stocks turn over by 0.17% less each day, about half of the raw difference of 0.30% reported in Table 1.[6]

The next two rows of Table 3 report results when we run the daily regressions separately by listed exchange. When either Nasdaq or NYSE/Amex firms are examined separately, the coefficient on the rural dummy is negative and highly significant. Rural Nasdaq firms have daily turnover that is 0.22% less than their urban counterparts. For listed firms, the difference remains highly significant but is only 0.07%. One reason that the difference in turnover is smaller for NYSE or Amex firms may be the "double counting" of volume on Nasdaq. With turnover cut approximately in half for both urban

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[5] This proxy has been used in a number of studies when direct measures of trading costs are not available for the sample period. See for example Bhushan (1994), or Bartov et al (2000).

[6] If the same regression was restricted to only firms above the yearly top quintile of NYSE firms, the mean coefficient on the rural dummy drops slightly to -0.10 (Fama-MacBeth t-statistic of -4.09). If the row 1 regression is run for only firms listed on the S&P 500, the average coefficient on the rural dummy drops in value to -0.10 (Fama-MacBeth t-statistic of -5.96).

and rural stocks, differences in turnover will also be smaller. Alternatively, a New York Stock Exchange or Amex listing may make rural firms more visible to investors, leading to higher rates of turnover.

The next four rows run the daily regressions sorting by exchange and whether the firms are smaller or larger than the NYSE median capitalization. In all four cases, the coefficient on the rural dummy is negative and highly significant. Both large and small rural firms, regardless of listed exchange, trade significantly less than their urban counterparts.[7]

Several robustness test results are shown in Table 4. We first split the sample period into two ten-year subperiods covering 1983-1992 and 1993-2002.[8] Since we do not have institutional or investor holding data back to 1983, we drop these variables from the subperiod regressions. In addition, intercepts and the four industry dummies are included in the regressions, but not reported in the table to save space. Subperiod results are shown in Panel A. The coefficient on the rural dummy is negative and significant in both subperiods.

As noted previously, we restrict our sample to firms with a stock price of $5 or more. In Panel B, we allow all firms into the sample regardless of stock price. The inclusion of many low priced stocks has no impact on our overall results. The coefficients on the rural dummies are highly significant, although slightly lower in magnitude compared to the sample of firms with stock prices of $5 or more.

Panel C reports results of regressions estimated for 1983-2002 with different definitions of urban firms. In the first regression, we define urban firms as only those based in the New York metropolitan area. Firms based in the other large cities are omitted. In the second regression, we define urban stocks as those with headquarters in the five largest U.S. metropolitan areas rather than the ten largest.[9] Using these

[7] When a stock does not trade on a day, we include it in the regression with a turnover of zero. This seems unlikely to affect results. There is almost no non-trading for large stocks and in recent years, and results are similar to regressions that include small firms and regressions that use the early part of the sample period.

[8] We pick 1983 as the starting point because trading volume for Nasdaq firms is missing on CRSP before November 1, 1982.

[9] The five largest U.S. cities are New York City, Los Angeles, Chicago, Washington-Baltimore, and San Francisco.

definitions of urban firms does not change the results. Rural stocks turn over less, and the difference remains highly significant.

In the last regression in Panel C, we alter the definition of urban firms to include all the previously excluded firms. These are stocks that are located within 100 miles of a metropolitan area of at least one million but that are not in one of the ten largest cities. That is, firms based in Kansas City, New Orleans, or Seattle, for instance, are now included in the urban portfolio. The coefficient on the rural firm dummy remains negative and highly significant, but is now only –0.12. The turnover results appear to be diluted by including the "in between" firms in the urban category.

The last two Panels of Table 4 use slightly different measures of liquidity as the dependent variable. Panel D uses turnover divided by the absolute value of returns. This variable tells us the amount investors can trade for a given level of price impact. Panel D regressions include only firms with a non-zero return on that day. Results are reported separately for a regression that includes all firms, a regression that includes only Nasdaq firms, and a regression that includes only NYSE/Amex firms. In each case, the rural dummy is negative and highly significant. Panel E uses the absolute value of returns divided by trading volume as the dependent variable. This measures the price impact of a given amount of trading. Regressions in Panel E discard firms with no trading volume. The coefficient on the rural dummy is positive and significant for each of the regressions reported in this panel. Clearly, rural firms have much lower levels of liquidity than their urban counterparts after adjusting for other factors.

It is interesting and somewhat surprising that in Panels A and B the coefficient on the rural dummy is smaller for 1983-1992 than for 1993-2002. To examine this more closely, we calculate mean daily turnover each year for all stocks. We then categorize them by size, exchange listing, and whether they are located in urban or rural areas. Figure 2 presents annual average daily turnover for large Nasdaq, large NYSE/Amex, small Nasdaq, and small NYSE/Amex urban and rural stocks. Figure 2a depicts turnover for large Nasdaq urban and rural stocks. The increase in urban stock turnover relative to rural stock turnover is particularly striking for large Nasdaq stocks. During the 1983–2002 period, daily turnover of large Nasdaq stocks from urban areas quadrupled from about 0.5% to about 2.0% per day. Large rural Nasdaq stocks also saw an increase in turnover, but it was much smaller. About 0.25% of their shares turned over daily in 1983 while about 0.50% turned over each day in 2002. In contrast, as shown in Figure 2b, large NYSE/Amex stocks that were based in rural areas and those based in urban areas experienced almost the same increase in turnover from 1983 through 2002.

Figures 2c and 2d depict turnover of small Nasdaq and small NYSE/Amex firms over 1983-2002. The turnover of small Nasdaq stocks located in urban areas increased substantially over 1983–2002 while the turnover of small Nasdaq stock from rural areas displayed only a slight increase. Figure 2d reveals that the turnover of small NYSE/Amex firms from urban areas did increase relative to the turnover of small NYSE/Amex firms from rural areas but the effect was not as dramatic as for Nasdaq stocks.

Turnover did increase for rural firms over our sample period. It just increased much more for urban firms. The difference is particularly striking for Nasdaq stocks.

We do not have a definitive explanation for the increasing difference in turnover between urban and rural stocks. We can offer some conjectures, however. One is that trading costs have decreased since the mid-1990's as a result of regulatory reform and changes in tick size.[10] Trading costs fell especially dramatically for Nasdaq stocks. A stock that turned over frequently when trading costs were high was likely to turn over even more frequently when it became cheaper to trade. On the other hand, if investors are unaware of a stock, a decline in the cost of trading is unlikely to affect turnover.

Second, the mid–1990's saw the beginnings of online trading. Barber and Odean (2002) show that investors trade more often after switching to online trading. The urban stocks that were favored by investors who trade often were likely to experience even more trading when investors moved online.

4.4 Systematic and unsystematic turnover

We have shown that turnover is significantly lower for rural firms than urban firms, but do rural stocks trade less in response to firm-specific or market-wide factors? If the systematic component of turnover is smaller for rural firms, this would suggest that

[10] See Barclay et al (1999), Bessembinder (2003), and Werner (2003).

investors trade urban stocks in response to marketwide or industrywide information. This could simply mean that urban firms are more visible, or are known to more investors, and hence are more heavily traded when information that is relevant to numerous firms is revealed.

For every trading day over 1983–2002, we estimate market turnovers for Nasdaq and NYSE/Amex listed stocks. The Nasdaq market turnover is obtained by dividing the total number of Nasdaq shares traded on that day by the total number of shares outstanding for all Nasdaq firms. The NYSE/Amex market turnover is calculated in a similar manner. Then, for every stock we run a regression each calendar year:

$$turnover_{i,t} = \alpha_0 + \alpha_1 turnover_{m,t+1} + \alpha_2 turnover_{m,t} + \alpha_3 turnover_{m,t-1} + \varepsilon_{i,t} \qquad (2)$$

where $turnover_{i,t}$ is the turnover of stock i on day t and $turnover_{m,t}$ is the market turnover on day t.

To obtain the systematic turnover for stock i on day t, we multiply the coefficients by the average contemporaneous and lagged market turnovers.[11] The unsystematic turnover is just the intercept coefficient. We then average across all urban or rural stocks for a year. Table 5 reports the mean systematic and unsystematic turnover across all years.

For rural Nasdaq stocks, systematic turnover is only 0.242% of outstanding shares per day. For urban Nasdaq stocks, systematic turnover averages 0.623% of outstanding shares each day. Using the standard deviation of the difference in systematic turnover across the 20 years, we can calculate a t-statistic for the difference of 2.54, which, with 19 degrees of freedom, is significant at the 5% level. The second row of Table 5 reports unsystematic turnover. For rural Nasdaq stocks, this averages 0.035% of outstanding shares per day, but –0.056% per day for urban stocks. The t-statistic for the difference is 2.17, which is also significant at the 5% level.

These results in Table 5 imply that the greater turnover of urban stocks comes completely from systematic turnover. That is, when investors trade stocks for market wide reasons, they trade urban stocks. This finding seems to confirm that familiarity is an important criteria in determining trading. If investors trade in response to information that

[11] Estimation of systematic and unsystematic turnover has a long history in the accounting literature. See for example Morse (1981), Bamber (1986), Ziebart (1990), and Bamber, Barron, and Stober (1997).

concerns a particular stock they have to trade that stock. On the other hand, if investors could trade a number of different stocks in response to information with market-wide ramifications, they would trade the stocks that they are familiar with – and more people are familiar with urban stocks.

The next two rows give mean coefficients of stock turnover on contemporaneous market turnover and the previous days' market turnover. For rural Nasdaq stocks, the mean coefficient on contemporaneous market turnover is 0.39, and for urban Nasdaq stocks it is 0.88. It is interesting that rural stock turnover does not lag urban stock turnover. The coefficient on lagged turnover is 0.008 for rural stocks and 0.056 for urban stocks. Differences in systematic turnover do not occur because trading in rural stocks lags trading in urban ones. This bears further examination.

The next two columns of the table compare systematic and unsystematic turnover for urban and rural NYSE/Amex firms. The differences between NYSE/Amex urban and rural stocks are less than the differences between Nasdaq-listed stocks. Nevertheless, for urban listed stocks, the systematic component of turnover is larger than for rural listed stocks, and the difference is significant at the 5% level. The unsystematic components are similar.

To see if the differences in systematic and unsystematic turnover are driven by factors that are correlated with location rather than location itself, we regress our estimates of systematic and unsystematic turnover for each stock each year on a dummy for a rural headquarters location, the firm's capitalization at the beginning of the year, the log and inverse of the capitalization, industry dummies, a dummy for S&P 500 inclusion, the number of employees, and the number of shareholders. Median and mean coefficients computed across the 20 years are reported in Table 6. Fama-MacBeth t-statistics are calculated from the 20 regression coefficients after adjusting for the first-order autocorrelation of the coefficient estimates.

Results for Nasdaq stocks are presented in Panel A of Table 6. When cross-sectional regressions are run with coefficients of the stock turnover on the contemporaneous market turnover (α_2) as the dependent variable, we see that the mean coefficient on the rural dummy is -0.313 while the median is -0.314. The Fama-MacBeth t-statistic is –7.12. After adjustment for capitalization differences and differences in industry, urban stock turnover is much more sensitive to contemporaneous market turnover than is rural stock turnover.

The coefficients from the regressions of systematic turnover on capitalization and industry variables are presented next. Again, we see that systematic turnover is smaller for rural stocks even after adjusting for these other factors. When unsystematic turnover is the dependent variable in the regressions, as shown next, the coefficient on the rural dummy is positive. Unsystematic turnover is higher for Nasdaq rural stocks, all else equal.

Results for NYSE/Amex stocks, shown in Panel B, are similar but weaker. Rural stocks are less sensitive to same-day market turnover than are similar urban stocks. Rural stocks have lower systematic turnover, although the Fama-MacBeth t-statistic is only 1.64. Unsystematic turnover is not significantly different across the urban and rural stocks.

Turnover is lower for rural stocks basically because their systematic turnover is lower. Systematic turnover is trading arising from market or industrywide factors. When investors have a choice of stocks to trade, they are likely to trade familiar stocks – which are likely to be urban stocks. Unsystematic turnover, or volume attributable to firm-specific factors, is the same or greater for rural stocks.

4.5. Trading costs and location

Using TAQ data, we calculate several measures of trading costs for each stock each month over 1993-1995. Trading costs are only calculated for a stock on a given day if the price exceeds \$5 for the entire day.[12] The first trading cost measure, the quoted spread, is obtained by dividing the difference between quoted bid and ask prices by the contemporaneous bid-ask midpoint at the time each trade took place over the month. The quoted spread reflects the maximum round-trip trading cost that a small order would expect to pay as a percentage of the stock's value.

Effective spreads are calculated as twice the absolute value of the difference between the trade price and the contemporaneous bid-ask midpoint, divided by the

[12] When we omit the price screen results are somewhat stronger but very similar.

midpoint. For listed stocks, we use the quote midpoint five seconds before as the contemporaneous stock price. This is because specialists often update quotes before reporting trades. For Nasdaq stocks, we use the quote with the same time stamp as the contemporaneous quote. We use only quotes from the primary exchange for a stock – the NYSE, Amex, or Nasdaq. Quotes from, for example, the Boston or Midwest stock exchanges are not used. We calculate mean effective spreads for each stock each month for three trade sizes: fewer than 500 shares, 500 to 1,000 shares, and more than 1,000 shares. The effective spreads reflect the amount that investors actually paid to trade. We measure effective spreads, like quoted spreads, in terms of round-trip trading costs as a percentage of the stock price

For each of the 36 months in our sample, we run cross-sectional regressions of individual stock trading cost measures on variables for a rural location, capitalization, number of analysts, inverse of the price, and industry. The average coefficients across the 36 months are reported in Table 7. Fama-MacBeth t-statistics, calculated after adjusting for first-order autocorrelation of the coefficients over the 36 months, are shown in parentheses.

Panel A reports results for Nasdaq stocks. Quoted spread regression results are reported in the first row. The coefficient on the rural dummy is positive and highly significant. The mean coefficient on the rural dummy is 0.49, indicating that after adjustment for other factors, quoted spreads, as a percentage of stock price, are 49 basis points higher for rural stocks. To put this in perspective, this means that quoted spreads are $0.125 wider for a $25 rural stock than for a $25 urban stock. The impact of rural location is very consistent across regressions so that the Fama-MacBeth t-statistic is 12.89.

Effective spreads for trades of all sizes are also higher for rural Nasdaq stocks than for urban Nasdaq stocks. Holding other factors constant, effective spreads are wider by 34 basis points for small trades, 27 basis points for trades of 500 to 1,000 shares, and 20 basis points for larger trades. Fama-MacBeth t-statistics indicate that a rural location is a statistically significant determinant of effective spreads for each trade size.

Results for NYSE/Amex stocks are shown in Panel B. For these stocks, rural location has little effect on trading costs. The rural dummy is not significant in the regressions for quoted spreads or effective spreads for trades of fewer than 500 shares. The rural dummy is negative and significant for effective spreads for trades of 500 to 1,000 shares and for trades of more than 1,000 shares. The effect is slight though, only about 3 basis points.

It is interesting that location is an important determinant of spreads for Nasdaq stock but not for stocks that list on the NYSE or Amex. We next explore two non-exclusive reasons why this might be the case. The first is that all stocks, regardless of location or size, have one specialist when they trade on the NYSE or Amex. Nasdaq stocks on the other hand, have differing numbers of market makers. Schultz (2003) finds that geography plays a role in the market making decision. Dealers are far more likely to make a market in a stock based in the same state than in an otherwise similar stock based out-of-state. If market makers are concentrated in cities, it is plausible that they will be less inclined to handle stocks of companies in rural areas. It is also possible that dealers are more likely to make markets in urban stocks because the stocks trade more.

Second, listing on the NYSE or Amex may increase a stock's visibility among investors. This may be particularly important for rural firms that are not familiar to as many people. The relative increase in visibility for rural firms may dampen differences in trading costs.

We employ a unique data set from Nasdaq to see if the number of dealers making markets in urban Nasdaq stocks exceeds the number making markets in rural Nasdaq stocks. The data set contains the trading volume reported by each Nasdaq market maker for each stock for each month from May through December 1995. These are the last eight months used in the spread regressions reported in Table 7. The number of dealers making markets in at least one stock varies from 480 in June 1995 to 516 in October 1995. Over this period, the mean number of stocks handled by a market maker ranges from 111.4 to 120.1 while the median ranges from 21 to 24.

For each of the eight months we run cross-sectional regressions with the number of market makers for a stock, number of large market makers in a stock, and the stock's Herfindahl index as dependent variables. We define large market makers as those who made markets in at least 200 stocks for at least one of the eight months. We calculate each stock's Herfindahl index each month by squaring the proportion of volume reported by each market maker and then summing the squared proportions. The explanatory variables used in the regressions include a dummy variable for rural firms, the natural logarithm of the capitalization at the end of the previous month, the standard deviation of daily returns, mean daily volume, and mean daily return over the prior twelve months, and industry dummies.

Average coefficients and average heteroskedasticity-consistent t-statistics across the eight regressions are reported in Table 8. The first column contains results when the number of market makers is the dependent variable. The mean coefficient on the rural dummy is –2.34, indicating that, all else equal, rural firms had 2.3 fewer market makers than urban firms. Over this time, the mean number of market makers per stock ranged from 10.9 to 11.2 while the median was either 9 or 10, suggesting that a decline of 2.3 market makers is economically significant. The mean t-statistic of –7.22 confirms the statistical significance of the difference in market makers across urban and rural stocks. Other variables are as expected. The number of market makers increases with the company capitalization, volatility, and trading volume. Results are consistent across the eight monthly regressions. The coefficient on the rural dummy is always less than –2 and the t-statistic is always less than –6.

The second column of the table reports average coefficients for regressions in which the number of large market makers is the dependent variable. These market makers are of particular interest because they are well-capitalized and experienced in making markets. They are likely to add more liquidity than other market makers. The coefficient on the rural dummy in this regression is –1.61, with an average t-statistic of –6.94. All else equal, a rural location means that firms have 1.6 fewer large market makers. Over this eight-month period, the number of large market makers average between 7.9 and 8.1 per stock, and the median was always 7.

The third column of the table presents mean regression coefficients when the Herfindahl index is the dependent variable. Recall that a high Herfindahl index means that trading volume is concentrated in the hands of a few market makers while a low Herfindahl index means that share volume is widely dispersed across market makers. Here the coefficient on the rural dummy is positive and significant with a mean value of 0.05. To assess the economic significance of this coefficient, consider the following example. If all urban firms had five market makers who divided order flow evenly and all rural firms had four market makers with equal market shares, the Herfindahl index for urban firms would be $5(1/5)^2 = 0.20$ and the Herfindahl index for rural firms would be $4(1/4)^2 = 0.25$. The difference would be 0.05, which is the number observed.

The results in Table 8 are robust. When we reran the number of market maker regressions separately for firms with capitalizations above and below the Nasdaq median we found the coefficient on the rural dummy to be negative and highly significant in every case. When we included all firms in all metropolitan areas in our urban sample the coefficient on rural remained negative and significant in every case although the point estimates were smaller. We also ran poisson regressions using the number of market makers as the dependent variable. In each case, the coefficient was negative with a robust z-statistic similar to the t-statistic reported in Table 8. Finally, the regressions were rerun including the number of employees, number of shareholders, and a dummy variable for inclusion in the S&P 500 index as explanatory variables. The number of observations in each regression decreases by about 20% when we include these variables because number of employees or shareholders is missing for some firms. Nevertheless, the rural location dummy is almost unchanged and remains highly significant in each regression.

Table 8 suggests one reason why rural Nasdaq stocks are more expensive to trade than urban Nasdaq stocks while NYSE/Amex rural and urban stocks have similar trading costs. Rural Nasdaq stocks have fewer market makers than their urban counterparts. On the other hand, all NYSE or Amex stocks have one specialist.

An alternative explanation is that all stocks, regardless of where they are located, are highly visible if they trade on the NYSE or Amex. In contrast, rural Nasdaq stocks may have less visibility than urban Nasdaq stocks. To see if exchange listing increases visibility for rural stocks more than urban stocks, we first calculate the mean daily return, mean daily turnover, and standard deviation of daily returns for the six months before and after listing for the 108 rural and 531 urban stocks that move from Nasdaq to the NYSE or Amex over 1983–2002. We also calculate the mean daily turnover on the equal-weighted index of all listed and Nasdaq stocks over the same period. We discard stocks with fewer than sixty return observations either before or after listing. We then run cross-sectional regressions of the change in daily turnover on a dummy for a rural location, the natural logarithm of the market capitalization on the first day of listing, the mean daily return in the six months before listing, the mean daily return in the six months following listing, the change in the volatility of daily returns, and the change in the market turnover. Regression coefficients are reported in Table 9 along with heteroskedasticity-consistent t-statistics.

The first row reports results when the rural location dummy is the only explanatory variable. It is positive and significant, indicating that turnover of rural stocks increases relative to urban stocks when they transfer from Nasdaq to either the NYSE or Amex. This suggests that listing on the NYSE/Amex increases the visibility of rural stocks relative to urban stocks.

In the next row, we report a regression that includes the log of market capitalization, mean return before listing and mean return after listing as explanatory variables. It is well established that volume increases after positive stock returns and declines after negative stock returns. Hence it is not surprising that the coefficient on the returns before listing is negative and the coefficient on returns following listing is positive. The coefficient on the market capitalization is negative and highly significant. Turnover declines more after listing for large firms than small firms.

One possible explanation is that for large stocks that list, a large portion of the volume comes from market orders executing against limit orders without specialist participation. For smaller stocks, specialists are more likely to participate. Thus for small stocks, trades are likely to be "double-counted" in the same way that they are on Nasdaq. The important result in this regression though is that the coefficient on the rural dummy becomes even more positive and significant when these other variables are included. Even after adjustment for these other factors, transferring from Nasdaq to the NYSE or Amex increases the trading of rural stocks relative to urban ones.

In the third row of the table, we include differences in return volatility before and after listing and differences in market turnover as explanatory variables. They are insignificant, while the rural dummy remains positive and highly significant. In the next three rows of the table we report regressions that are similar to the first three regressions but which define the before and after periods for listing as one year. We discard stocks with fewer than 125 returns before and after listing. Results are similar to what we found when we used six months before and after listing. In each case, the coefficient on the rural dummy is positive and significant. Turnover of rural stocks increases relative to turnover of urban stocks after they transfer from Nasdaq to the NYSE or Amex. We also get similar results when we consider only stocks that list on the NYSE or stocks that list on Amex (not shown). In each case the coefficient on rural is positive and significant.

Overall, these results suggest that listing on the NYSE or Amex increases the visibility of rural stocks. Thus it could be that differences in trading costs for urban and rural stock disappear after listing because the visibility of the rural stock increases. We are reluctant to push this argument too far, however. It is also possible that the causality runs the other way; smaller differences in trading costs between urban and rural stocks when the stocks are listed leads to relatively more trading for the rural stocks.

5. Conclusions

Recent research shows that investors hold and trade securities that have captured their attention, and that investors prefer to hold and trade shares of firms located nearby. Our work compares the liquidity of stocks in the ten largest U.S. cities with the liquidity of stocks in rural areas. Urban stocks are local stocks for many more people. Their familiarity to a large number of people ensures many potential investors for the stock. Our rural stocks, however, are local stocks to fewer people. They are likely to capture the attention of a far smaller number of possible stockholders. It will also be more difficult to obtain information on them for most investors. This suggests to us that the market for urban stocks is likely to be much more liquid than the market for rural stocks.

We find strong support for our contention that rural stocks are less liquid than urban stocks. All else equal, rural stocks are followed by fewer analysts and held by fewer institutions. Turnover is lower for rural stocks and trading costs are higher for the rural stocks that trade on Nasdaq. We provide evidence that when investors trade in response to market-wide factors, they chose to trade urban stocks.

The findings of this paper suggest several directions for future work. One is to examine whether returns of rural stocks lag returns of urban stocks. We would expect investors with industry-wide information or other information that is relevant for the pricing of many stocks to first trade the most liquid securities. The results of this paper suggest that urban stocks would be traded first. In addition, we would expect returns to be reflected first in stocks traded by sophisticated investors and followed by analysts. Our results indicate that these are more likely to be urban firms.

The big, interesting questions that flow from this research concern how information is diffused in an economy. Even in this time of instant, worldwide communication, we would expect geography to play an important role. Most fluctuations in stock prices seem to be associated with the sort of soft, informal information that is conveyed through conversation and casual observation rather than the hard information carried in quarterly reports or news announcements. Hence geographical proximity to investors proxies for the costs of obtaining information on a stock. A reasonable conjecture then is that information diffuses from urban to rural stocks.

An ambitious direction for future research would be to look at the impact of location on asset pricing. Hou and Moskowitz (2004) find that the idiosyncratic risk of stocks is priced for small, less visible stocks. The lack of systematic turnover for rural stocks is indicative of their lack of visibility and suggests that idiosyncratic risk may be priced for rural stocks. Much remains to be done on geography and asset pricing.

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Fig. 1 Rural areas of the United States (shaded).

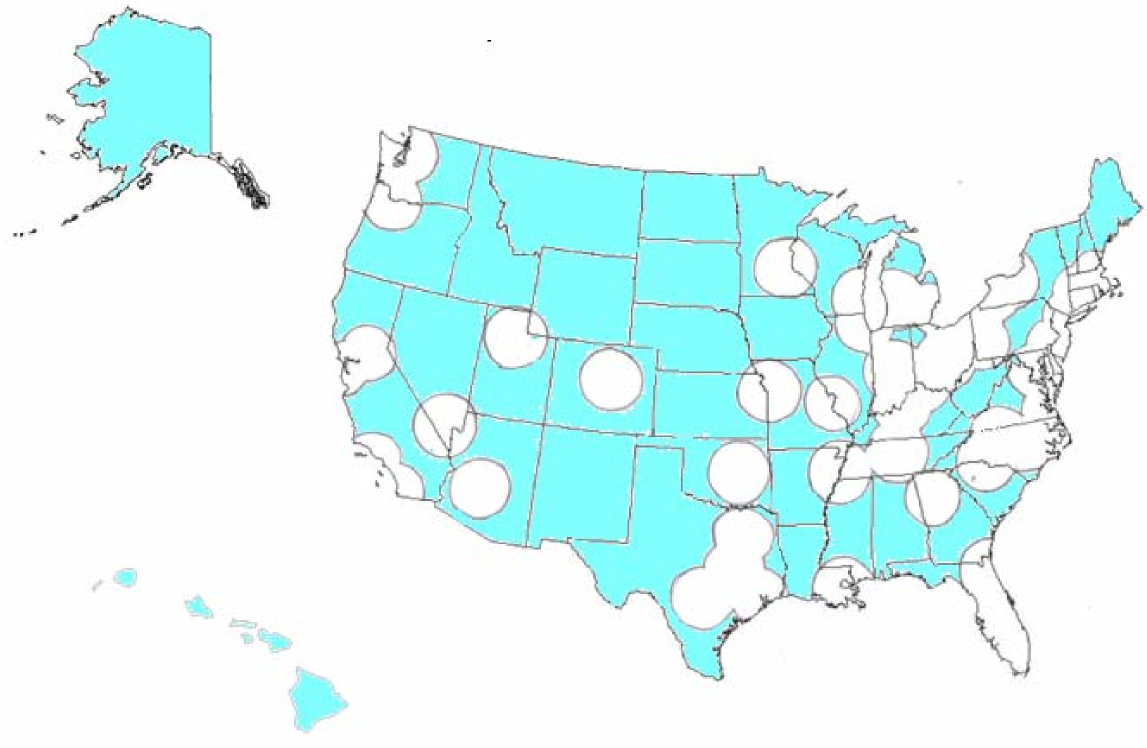

Fig. 2a Mean Daily Percentage Turnover 1983–2002, Large Nasdaq Firms

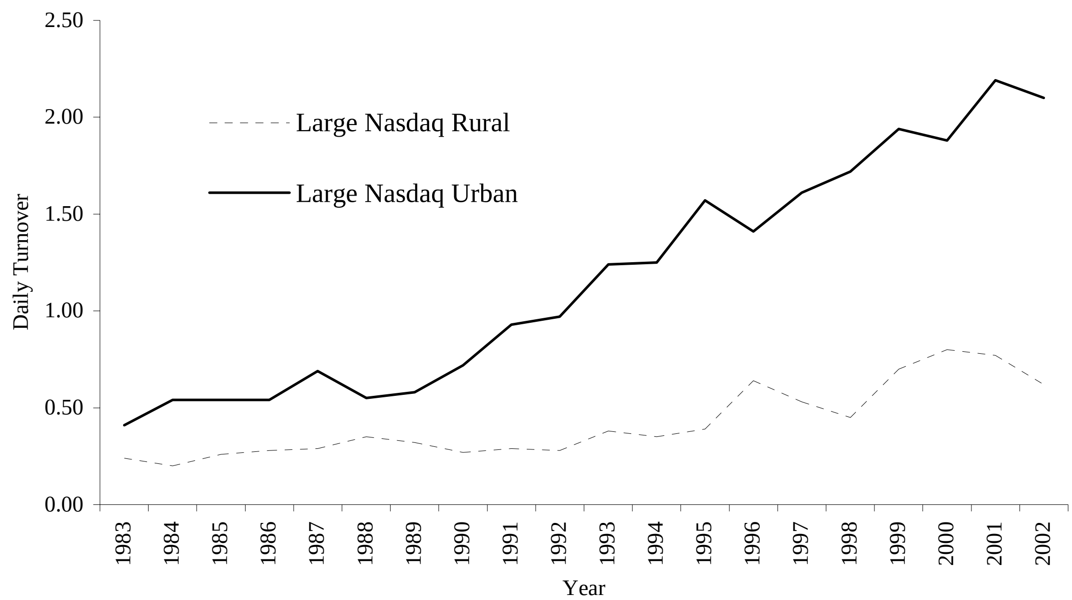

Fig. 2b Mean Daily Percentage Turnover 1983–2002, Large NYSE/Amex Firms

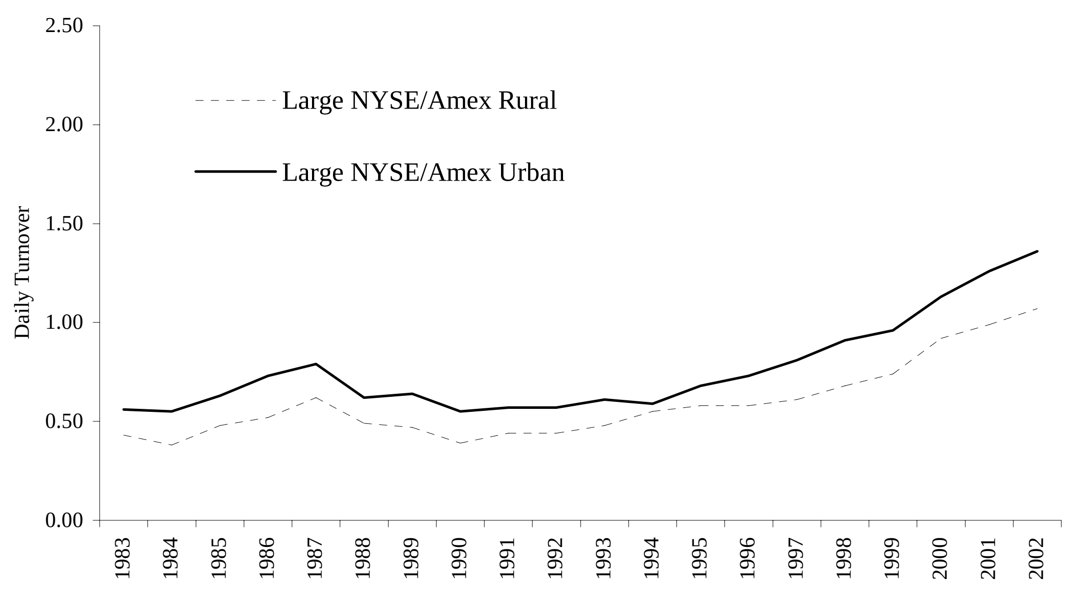

Fig. 2c Mean Daily Percentage Turnover 1983–2002, Small Nasdaq Firms

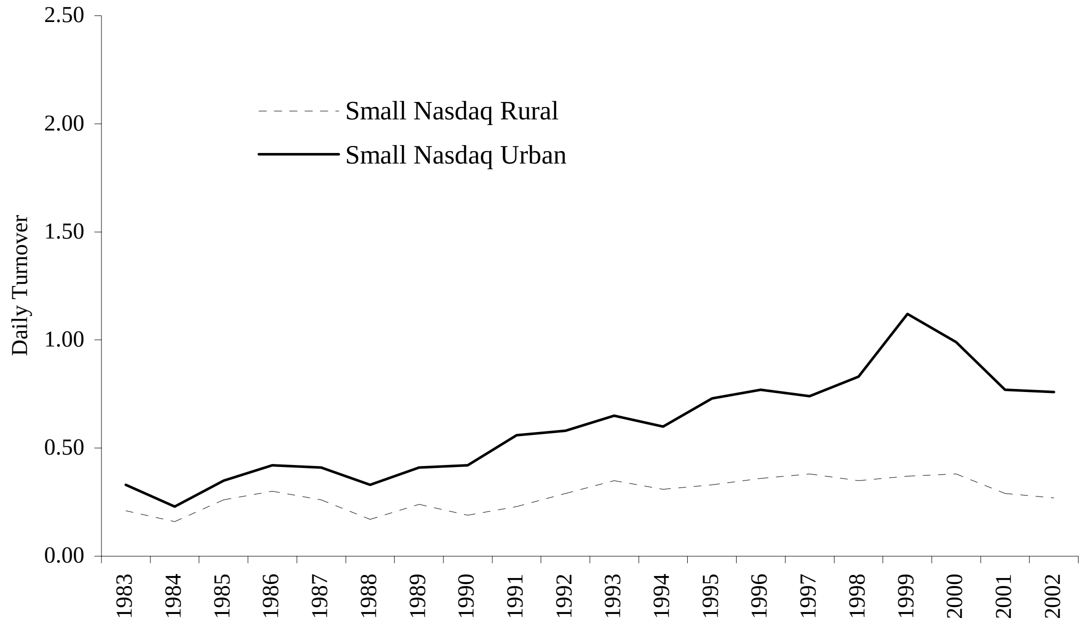

Fig. 2d Mean Daily Percentage Turnover 1983–2002, Small NYSE/Amex Firms

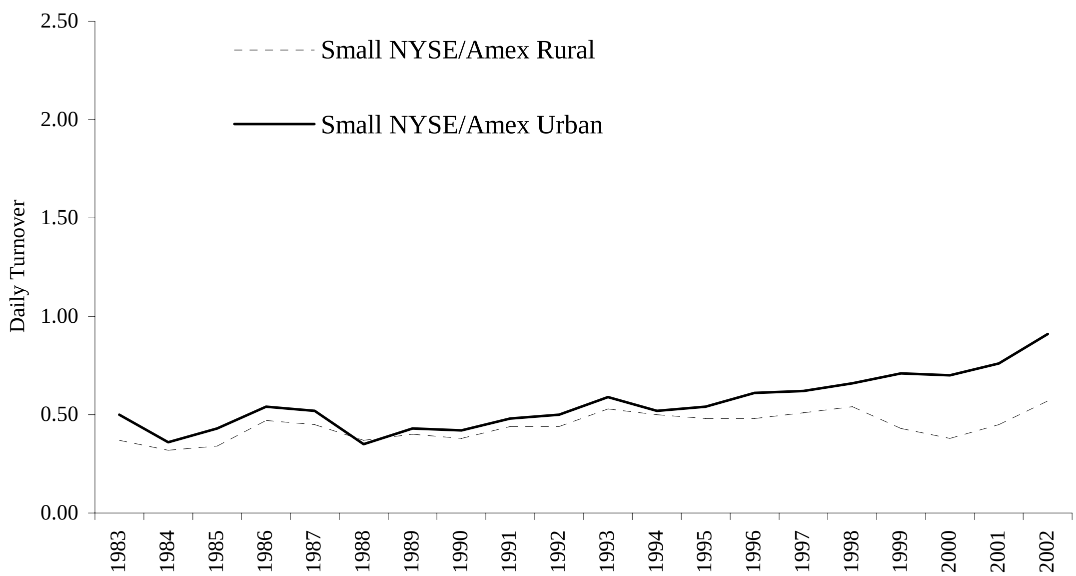

Table 1
Daily average statistics categorized by rural and urban portfolios, 1976-2002
A stock is located in an urban area if the company headquarters is in the metropolitan area of New York City, Los Angeles, Chicago, Washington, San Francisco, Philadelphia, Boston, Detroit, Dallas, or Houston. A stock is located in a rural 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 2000 census. Turnover is defined as trading volume divided by shares outstanding. For NYSE/Amex firms, trading volume is doubled to allow for more meaningful comparison with firms on Nasdaq. Small firms are defined as firms with a market capitalization less than the median NYSE firms in a given year while large firms are firms with a market value equal or greater than the median NYSE firm. Market values are in millions of dollars. Analyst coverage is from I/B/E/S. There are 6,818 daily portfolio observations.

Item	Rural Firms (1)	Urban Firms (2)	Small Rural Firms (3)	Small Urban Firms (4)	Large Rural Firms (5)	Large Urban Firms (6)
Mean Daily Return	0.073%	0.066%	0.079%	0.071%	0.054%	0.058%
% on NYSE/Amex	38%	52%	28%	40%	79%	83%
% on Nasdaq	62%	48%	72%	60%	21%	17%
Market Value	$659.4	$1,435.5	$109.1	$130.5	$2,914.7	$4,550.6
Turnover (post-1982)	0.37%	0.67%	0.32%	0.59%	0.56%	0.87%
% Manufacturing (SIC codes 20-39)	27%	41%	26%	41%	33%	43%
% Banking (SIC Codes 60-67)	34%	18%	37%	17%	20%	20%
% Transportation (SIC Codes 40-49)	15%	8%	13%	5%	24%	13%
% Mining (SIC Codes 10-14)	6%	4%	6%	4%	6%	5%
Insider Holdings (post-1987)	16.9%	18.6%	18.7%	21.7%	9.8%	11.4%
Institutional Holdings (post-1987)	26.5%	37.1%	22.1%	30.0%	43.5%	53.8%
# of Analysts	3.4	5.3	1.8	2.3	10.4	12.9
% in S&P 500 Index	5.9%	14.4%	0.5%	1.6%	28.7%	47.3%
Employees (in 1000s)	5.7	10.4	2.0	2.5	17.4	28.6
Shareholders (in 1000s)	8.9	17.9	3.8	2.8	23.5	52.2
Mean # of firms	388.5	1,501.4	315.0	1,077.6	73.5	423.8
Min. # of firms	245	1,024	186	694	44	271
Max. # of firms	569	2,080	468	1,549	115	777

Table 2
Average parameter values from monthly cross-sectional regressions of the number of analysts and the level of institutional holdings

In the regressions, the dependent variable is the number of analysts (Panel A) or the percentage of shares outstanding held by institutions (Panel B) for firm *i* in month *j*. The eleven explanatory variables are a dummy variable equal to one if the firm is located in a rural locale (else zero), the market value two days prior to calendar month *j* (shares outstanding times stock price), natural logarithm of the market value, dummy variables for manufacturing, banking, transportation, and mining industries (else zero), number of employees, number of shareholders, a dummy variable equal to one if the firm is in the S&P 500 Index (else zero), and a dummy variable equal to one if the firm is listed on Nasdaq (else zero). Small firms are defined as firms with a market capitalization less than the median NYSE firms in a given year while large firms are firms with a market value equal or greater than the median NYSE firm. The cross-sectional regressions weight each month equally. The parameter values are the average of the cross-sectional regressions. In parentheses are the Fama-MacBeth autocorrelation-adjusted t-statistics. There are 324 months (January 1976-December 2002) in Panel A and 177 months (April 1988-December 2002) in Panel B. The reported adjusted R^2's are the time-series average of the monthly cross-sectional R^2's.

$$\text{Number of Analysts}_{ij} \text{ or Institutional Holdings}_{ij} = a_{0j} + a_{1j}\text{Rural Dummy}_{ij} + a_{2j}\text{Market Value}_{ij} + a_{3j}\text{Log(Market Value)}_{ij} + a_{4j}\text{Manufacturing Dummy}_{ij} + a_{5j}\text{Bank Dummy}_{ij} + a_{6j}\text{Transportation Dummy}_{ij} + a_{7j}\text{Mining Dummy}_{ij} + a_{8j}\text{Log(Number of Employees)}_{ij} + a_{9j}\text{Log(Number of Shareholders)}_{ij} + a_{10j}\text{S\&P 500 Dummy}_{ij} + a_{11j}\text{Nasdaq Dummy}_{ij} + e_{ij}$$

Panel A: Dependent variable is the number of analysts

Average Parameter Values

Row	Sample	Intercept	Rural Dummy	Mkt Value	Log (Mkt Value)	Mfg. Dummy	Bank Dummy	Transp. Dummy	Mining Dummy	Log (Employees)	Log (Shareholders)	S&P 500 Dummy	Nasdaq Dummy	$R^2_{adj.}$
(1)	All Firms	-6.32 (-5.58)	-0.32 (-3.19)	2.26 (3.02)	2.01 (9.73)	0.01 (0.06)	-0.16 (-0.63)	-0.37 (-1.45)	0.93 (0.79)	0.10 (1.58)	0.29 (1.08)	4.59 (5.19)	0.37 (0.80)	0.629
(2)	Only Small Firms	-0.85 (-3.47)	-0.11 (-2.05)	100.46 (8.07)	0.49 (5.45)	-0.08 (-0.69)	-0.49 (-2.09)	-0.42 (-3.05)	0.49 (1.49)	0.17 (3.60)	0.05 (1.01)	2.48 (7.36)	0.19 (0.72)	0.299
(3)	Only Large Firms	-19.21 (-9.47)	-0.47 (-2.69)	-0.22 (-0.71)	4.07 (13.24)	0.08 (0.33)	-0.04 (-0.08)	-0.69 (-1.88)	2.18 (1.44)	-0.34 (-2.02)	0.61 (1.08)	3.07 (5.79)	0.47 (0.44)	0.440

Panel B: Dependent variable is the level of institutional holdings

Average Parameter Values

Row	Sample	Intercept	Rural Dummy	Mkt Value	Log (Mkt Value)	Mfg. Dummy	Bank Dummy	Transp. Dummy	Mining Dummy	Log (Employees)	Log (Shareholders)	S&P 500 Dummy	Nasdaq Dummy	$R^2_{adj.}$
(1)	All Firms	1.69 (0.49)	-4.37 (-10.06)	-6.84 (-2.85)	6.41 (13.06)	2.27 (5.37)	-1.85 (-0.96)	-2.73 (-7.23)	5.08 (3.46)	2.97 (10.23)	-1.08 (-3.89)	1.96 (0.96)	-0.46 (-0.53)	0.352
(2)	Only Small Firms	-4.68 (-1.39)	-3.79 (-9.07)	-51.31 (-2.57)	7.90 (11.83)	2.24 (7.51)	-3.15 (-1.99)	-1.26 (-1.59)	6.08 (3.80)	3.18 (7.83)	-0.08 (-0.39)	3.94 (2.05)	-0.28 (-0.47)	0.258
(3)	Only Large Firms	28.81 (3.82)	-6.98 (-29.31)	-3.55 (-3.49)	2.97 (3.09)	2.95 (4.21)	1.13 (0.50)	-3.54 (-1.73)	0.78 (0.30)	2.42 (6.87)	-2.61 (-10.57)	7.74 (20.12)	-0.83 (-0.51)	0.155

Table 3

Average parameter values from daily cross-sectional regressions of percentage turnover, 1988-2002

In the regressions, the dependent variable is the daily turnover for firm *i* on calendar day *j*. Turnover is defined as trading volume divided by shares outstanding. For firms listed on NYSE/Amex, trading volume is doubled to allow for more meaningful comparison with firms on Nasdaq. The fifteen explanatory variables are a dummy variable equal to one if the firm is located in a rural locale (else zero), the market value two days prior to calendar day *j* (shares outstanding times stock price), the natural logarithm of the market value, the number of analysts, employees, shareholders, percentage insider holdings, percentage institutional holdings, inverse of stock price, dummy variables for manufacturing, banking, transportation, and mining industries (else zero), a dummy variable equal to one if the firm is in the S&P 500 Index (else zero), and a dummy variable equal to one if the firm is listed on Nasdaq (else zero). The cross-sectional regressions weight each day equally. The parameter values are the average of the cross-sectional regressions. In parentheses are the Fama-MacBeth autocorrelation-adjusted t-statistics. Intercepts and coefficients on the four industry dummies are not reported to save space. The reported adjusted R^2's are the time-series average of the daily cross-sectional R^2's. There are 3,722 trading days during April 1988-December 2002.

$$\text{Turnover}_{ij} = a_{0j} + a_{1j}\text{Rural Dummy}_{ij} + a_{2j}(\text{Market Value})_{ij} + a_{3j}\text{Log(Market Value)}_{ij} + a_{4j}\text{Number of Analysts}_{ij} + a_{5j}\text{Insider Holdings}_{ij} + a_{6j}\text{Institutional Holdings}_{ij} + a_{7j}\text{Inverse of Stock Price}_{ij} + a_{8j}\text{Manufacturing Dummy}_{ij} + a_{9j}\text{Bank Dummy}_{ij} + a_{10j}\text{Transportation Dummy}_{ij} + a_{11j}\text{Mining Dummy}_{ij} + a_{12j}\text{Log(Number of Employees)}_{ij} + a_{13j}\text{Log(Number of Shareholders)}_{ij} + a_{14j}\text{S\&P 500 Dummy}_{ij} + a_{15j}\text{Nasdaq Dummy}_{ij} + e_{ij}$$

Row	Sample	Rural Dummy	Mkt Value	Log (Mkt Value)	# of Analysts	Insider Holdings	Instit. Holdings	1/Stock Price	Log (Employ.)	Log (SHolders)	S&P 500 Dummy	Nasdaq Dummy	$R^2_{adj.}$
(1)	All Firms	-0.17	-0.17	0.11	0.03	-0.26	0.31	-0.27	-0.08	-0.02	-0.19	0.16	0.074
		(-11.04)	(-12.61)	(7.26)	(4.87)	(-8.18)	(6.71)	(-1.18)	(-6.21)	(-4.09)	(-6.17)	(4.45)	
(2)	Only Nasdaq Firms	-0.22	-0.73	0.15	0.06	-0.26	0.09	-0.99	-0.12	-0.01	-0.32		0.110
		(-10.72)	(-4.77)	(14.02)	(11.28)	(-6.08)	(1.51)	(-3.18)	(-8.61)	(-2.73)	(-5.86)		
(3)	Only NYSE/Amex Firms	-0.07	-0.11	0.03	0.02	-0.23	0.40	0.64	-0.01	-0.02	-0.06		0.057
		(-8.55)	(-11.42)	(2.85)	(4.89)	(-11.82)	(10.67)	(3.71)	(-0.92)	(-2.22)	(-3.67)		
(4)	Only Small Nasdaq	-0.19	-0.22	0.14	0.06	-0.30	-0.03	-0.64	-0.11	-0.00	-0.25		0.077
		(-12.32)	(-0.26)	(9.12)	(12.46)	(-6.01)	(-0.40)	(-2.72)	(-7.75)	(-0.72)	(-3.33)		
(5)	Only Large Nasdaq	-0.35	-0.22	0.01	0.05	-0.02	0.51	-4.73	-0.20	-0.01	-0.17		0.199
		(-6.21)	(-2.70)	(0.24)	(9.12)	(-0.27)	(4.28)	(-4.91)	(-7.84)	(-0.74)	(-2.95)		
(6)	Only Small NYSE/Amex	-0.07	-3.81	0.10	0.04	-0.29	0.03	0.54	-0.02	-0.00	0.19		0.050
		(-5.66)	(-5.28)	(9.64)	(6.55)	(-12.05)	(0.89)	(3.83)	(-2.31)	(-0.47)	(2.90)		
(7)	Only Large NYSE/Amex	-0.10	-0.03	-0.10	0.02	-0.15	0.61	1.12	0.02	-0.03	-0.02		0.082
		(-9.81)	(-7.91)	(-8.29)	(5.92)	(-4.94)	(19.16)	(2.77)	(3.59)	(-2.11)	(-1.67)		

Table 4

Robustness tests of urban and rural turnover, 1983-2002

In Panels A, B, and C, the dependent variable is the daily turnover for firm *i* in calendar day *j*. Panel D uses turnover/|Return| while Panel E uses |Return|/volume as the dependent variable. For firms listed on NYSE/Amex, trading volume is doubled to allow for more meaningful comparison with firms on Nasdaq. The explanatory variables are a dummy variable equal to one if the firm is located in a rural locale (else zero), the market value and the natural logarithm of the market value, the number of analysts, employees, shareholders, inverse of stock price, dummy variables for manufacturing, banking, transportation, and mining industries (else zero), an S&P 500 Index dummy (else zero), and a dummy variable equal to one if the firm is listed on Nasdaq (else zero). The cross-sectional regressions weight each day equally. The parameter values are the average of the cross-sectional regressions. In parentheses are the Fama-MacBeth autocorrelation-adjusted t-statistics. Intercepts and coefficients on the four industry dummies are not reported to save space. The reported adjusted R^2's are the time-series average of the daily cross-sectional R^2's.

$$\text{Turnover}_{ij} = a_{0j} + a_{1j}\text{Rural Dummy}_{ij} + a_{2j}(\text{Market Value})_{ij} + a_{3j}\text{Log(Market Value)}_{ij} + a_{4j}\text{Number of Analysts}_{ij} + a_{5j}\text{Inverse of Stock Price}_{ij} + a_{6j}\text{Manufacturing Dummy}_{ij} + a_{7j}\text{Bank Dummy}_{ij} + a_{8j}\text{Transportation Dummy}_{ij} + a_{9j}\text{Mining Dummy}_{ij} + a_{10j}\text{Log(Number of Employees)}_{ij} + a_{10j}\text{Log(Number of Shareholders)}_{ij} + a_{12j}\text{S\&P 500 Dummy}_{ij} + a_{13j}\text{Nasdaq Dummy}_{ij} + e_{ij}$$

Panel A. Subperiod results (all firms with stock price of $5 or more)

Row	Time Period	Rural Dummy	Mkt Value	Log (Mkt Value)	# of Analysts	1/Stock Price	Log (Emply.)	Log (Sholders)	S&P 500 Dummy	Nasdaq Dummy	$R^2_{adj.}$
(1)	1983-2002	-0.16	-0.18	0.09	0.03	-0.51	-0.06	-0.01	-0.12	0.08	0.057
	Obs=5,049	(-11.39)	(-18.90)	(7.82)	(4.65)	(-2.23)	(-4.58)	(-0.97)	(-3.70)	(1.76)	
(2)	1983-1992	-0.10	-0.21	0.05	0.01	0.32	-0.02	0.01	-0.00	-0.02	0.041
	Obs=2,529	(-22.66)	(-30.08)	(8.53)	(10.04)	(4.92)	(-3.87)	(1.68)	(-0.27)	(-0.73)	
(3)	1993-2002	-0.22	-0.16	0.13	0.04	-1.35	-0.09	-0.02	-0.25	0.18	0.072
	Obs=2,520	(-17.52)	(-9.41)	(11.49)	(6.02)	(-5.06)	(-5.85)	(-3.00)	(-9.55)	(5.94)	

Panel B. Subperiod results (all firms regardless of stock price)

Row	Time Period	Rural Dummy	Mkt Value	Log (Mkt Value)	# of Analysts	1/Stock Price	Log (Emply.)	Log (Sholders)	S&P 500 Dummy	Nasdaq Dummy	$R^2_{adj.}$
(1)	1983-2002	-0.13	-0.19	0.10	0.03	0.03	-0.04	-0.01	-0.16	0.05	0.064
	Obs=5,049	(-10.86)	(-18.10)	(8.01)	(4.57)	(2.70)	(-3.21)	(-1.41)	(-4.25)	(1.22)	
(2)	1983-1992	-0.08	-0.22	0.05	0.01	-0.01	-0.01	0.00	-0.03	-0.04	0.057
	Obs=2,529	(-18.89)	(-26.51)	(9.97)	(9.93)	(-4.60)	(-3.27)	(1.18)	(-2.44)	(-2.13)	
(3)	1993-2002	-0.18	-0.16	0.14	0.04	0.06	-0.07	-0.01	-0.29	0.15	0.071
	Obs=2,520	(-17.91)	(-10.11)	(11.36)	(6.21)	(3.62)	(-3.94)	(-3.86)	(-9.05)	(4.46)	

Panel C. Results for different definitions of urban (all firms with stock price of $5 or more)

Row	Urban Definition	Rural Dummy	Mkt Value	Log (Mkt Value)	# of Analysts	1/Stock Price	Log (Emply.)	Log (Sholders)	S&P 500 Dummy	Nasdaq Dummy	$R^2_{adj.}$
(1)	New York Only	-0.14	-0.11	0.06	0.02	-0.15	-0.03	-0.00	-0.07	-0.01	0.048
		(-7.81)	(-18.39)	(9.13)	(5.55)	(-0.90)	(-3.33)	(-0.96)	(-3.03)	(-0.82)	
(2)	Biggest 5 Cities	-0.18	-0.18	0.10	0.03	-0.38	-0.06	-0.01	-0.15	0.08	0.062
		(-11.12)	(-15.55)	(9.49)	(4.50)	(-1.65)	(-4.73)	(-2.57)	(-4.96)	(1.76)	
(3)	All non-rural stocks	-0.12	-0.17	0.09	0.02	-0.43	-0.06	-0.02	-0.11	0.03	0.047
		(-12.56)	(-14.41)	(7.17)	(4.51)	(-1.84)	(-4.77)	(-3.07)	(-3.68)	(0.47)	

Panel D. Using Turnover/|Return| (if Return is not equal to zero) as a measure of liquidity

Row	Sample	Rural Dummy	Mkt Value	Log (Mkt Value)	# of Analysts	1/Stock Price	Log (Emply.)	Log (Sholders)	S&P 500 Dummy	Nasdaq Dummy	$R^2_{adj.}$
(1)	All Firms	-9.68	-10.67	4.81	1.92	-289.86	-1.57	0.24	3.92	-4.70	0.062
		(-16.79)	(-27.17)	(11.71)	(7.76)	(-5.68)	(-6.36)	(1.28)	(3.94)	(-3.02)	
(2)	Nasdaq Only	-11.02	-26.04	5.46	2.97	-218.64	-3.42	0.17	-4.98		0.072
		(-10.16)	(-5.40)	(11.87)	(11.02)	(-5.73)	(-13.12)	(0.85)	(-2.37)		
(3)	NYSE/ Amex Only	-6.21	-9.46	1.70	1.42	-417.55	1.46	0.21	6.39		0.052
		(-8.14)	(-27.87)	(4.70)	(7.03)	(-5.24)	(5.74)	(0.54)	(6.42)		

Panel E. Using |Return|/trading volume (if trading volume is not equal to zero) as a measure of illiquidity

Row	Sample	Rural Dummy	Mkt Value	Log (Mkt Value)	# of Analysts	1/Stock Price	Log (Emply.)	Log (Sholders)	S&P 500 Dummy	Nasdaq Dummy	$R^2_{adj.}$
(1)	All Firms	0.14	0.45	-0.56	0.02	4.74	0.09	-0.00	0.69	0.51	0.042
		(7.67)	(12.53)	(-22.58)	(18.28)	(13.76)	(13.66)	(-0.23)	(25.10)	(9.91)	
(2)	Nasdaq Only	0.22	9.19	-1.22	0.02	3.70	0.15	-0.04	0.24		0.044
		(6.17)	(5.63)	(-17.41)	(5.54)	(5.69)	(10.54)	(-2.88)	(2.09)		
(3)	NYSE/ Amex Only	0.01	0.12	-0.12	0.00	2.14	0.00	-0.02	0.12		0.112
		(3.62)	(4.90)	(-14.58)	(8.48)	(7.41)	(2.91)	(-6.09)	(20.93)		

Table 5
Systematic and unsystematic components of firm turnover, 1983-2002

Market turnover is obtained for each day over 1983-2002 by dividing the number of shares traded for all Nasdaq stocks by the total number of outstanding shares for all Nasdaq stocks. The NYSE/Amex market turnover is calculated in a similar manner. For each stock each year, the following time series regression is run using daily turnover:

$$turnover_{i,t} = \alpha_0 + \alpha_1 turnover_{m,t+1} + \alpha_2 turnover_{m,t} + \alpha_3 turnover_{m,t-1} + \varepsilon_{i,t}$$

Systematic turnover is α_1 times market turnover the next day, plus α_2 times the contemporaneous market turnover, plus α_3 times the previous day's market turnover. Unsystematic turnover is α_0. For each year, an average systematic turnover, average unsystematic turnover, average α_1, and average α_2 is calculated for urban and rural stocks. T-statistics are calculated using the time-series standard deviation of the average coefficients after an adjustment for autocorrelation.

	Nasdaq Stocks			NYSE/Amex Stocks		
	Rural	Urban	Difference T-statistic	Rural	Urban	Difference T-statistic
Systematic Turnover	0.242%	0.623%	2.54	0.210%	0.271%	2.26
Unsystematic Turnover	0.035%	-0.056%	-2.17	0.032%	0.030%	-0.36
Coefficient Mkt. Turnover t+1	0.027	0.077	2.31	0.067	0.053	-0.69
Coefficient Mkt. Turnover t	0.392	0.878	13.34	0.702	0.917	4.61
Coefficient Mkt. Turnover t-1	0.008	0.056	4.48	0.045	0.052	0.34
Sum Coefficients t-1 to t+1	0.426	1.011	11.08	0.814	1.023	3.87
Average R^2	0.014	0.024		0.029	0.040	

Table 6
Regressions of systematic and unsystematic turnover of urban and rural stocks on market capitalization and industry variables

Market turnover is obtained for each day over 1983-2002 by dividing the number of shares traded for all Nasdaq stocks by the total number of outstanding shares for all Nasdaq stocks. The NYSE/Amex market turnover is calculated in a similar manner. For each stock, the following time series regression is run for each year:

$$turnover_{i,t} = \alpha_0 + \alpha_1 turnover_{m,t+1} + \alpha_2 turnover_{m,t} + \alpha_3 turnover_{m,t-1} + \varepsilon_{i,t}$$

For each stock each year, α_2 is the same day market turnover coefficient. Systematic turnover is α_1 times the next day's market turnover, plus α_2 times the contemporaneous market turnover, plus α_3 times the previous day's market turnover. Unsystematic turnover is α_0. For each year, cross-sectional regressions were run with the same day market turnover coefficient, the systematic turnover, and the unsystematic turnover as dependent variables. Explanatory variables include a dummy variable for a firm based in a rural location, capitalization, the inverse of capitalization, the natural logarithm of capitalization, industry dummies, employees, shareholders, and a S&P 500 Index dummy. Capitalization is measured at the beginning of each year. The Fama-MacBeth t-statistics are calculated using the time series standard deviation of the cross-sectional regression t-statistics after adjusting for autocorrelation in the coefficients.

Panel A. Nasdaq stocks regressed on Nasdaq market turnover

	Rural Dummy	Mkt. Value	1/ Market Value	Log(Mkt Value)	Mfg. Dummy	Bank Dummy	Transport Dummy	Mining Dummy	S&P Dummy	Log (Number Empl.)	Log (Number Shrhldrs)
Same Day Mkt Turnover Coefficient (α_2):											
Mean Coefficient	-0.313	-0.542	3,484.0	0.690	-0.067	-0.832	-0.298	-0.534	-0.043	1.156	-0.103
Median Coefficient	-0.314	-0.034	1,150.5	0.351	0.070	-0.651	-0.276	-0.330	0.015	0.790	-0.067
Fama–MacBeth t-stat	-7.12	-1.19	1.55	2.13	-0.63	-4.79	-4.49	-2.80	-0.62	2.90	-3.08
Systematic Turnover (α_1 turnover$_{m,t+1}$+α_2 turnover$_{m,t}$+ α_3 turnover$_{m,t-1}$):											
Mean Coefficient	-2.389	-2.236	4,714.6	2.563	-0.375	-5.408	-2.376	-5.186	0.219	4.299	-1.009
Median Coefficient	-1.942	-0.357	2,205.4	1.554	0.368	-3.341	-1.277	-2.619	0.293	3.094	-0.525
Fama–MacBeth t-stat	-3.81	-1.41	0.43	2.43	-0.29	-4.27	-1.52	-1.86	0.73	3.75	-1.74
Unsystematic Turnover (α_0):											
Mean Coefficient	0.720	1.509	7,189.5	-0.265	0.314	1.638	0.965	2.971	-0.145	-1.548	0.523
Median Coefficient	0.628	0.096	1,366.9	-0.051	-0.364	0.547	0.523	1.107	-0.128	0.157	0.126
Fama–MacBeth t-stat	3.46	1.24	0.52	-0.27	0.32	2.19	0.76	1.49	-0.64	-0.99	1.26

Panel B. NYSE/Amex stocks regressed on NYSE/Amex market turnover

	Rural Dummy	Mkt. Value	1/ Market Value	Log(Mkt Value)	Mfg. Dummy	Bank Dummy	Transport Dummy	Mining Dummy	S&P Dummy	Log (Number Empl.)	Log (Number Shrhldrs)
Same Day Mkt Turnover Coefficient (α_2):											
Mean Coefficient	-0.135	-0.184	1,949.0	0.174	-0.172	-0.292	-0.351	-0.151	0.139	0.003	-0.022
Median Coefficient	-0.138	-0.186	97.8	0.139	-0.146	-0.320	-0.358	-0.155	0.174	0.017	-0.036
Fama–MacBeth t-stat	-5.72	-6.62	1.08	3.75	-6.46	-5.00	-7.26	-3.29	1.41	0.22	-0.93
Systematic Turnover (α_1 turnover$_{m,t+1}$+α_2 turnover$_{m,t}$+ α_3 turnover$_{m,t-1}$):											
Mean Coefficient	-0.457	-0.441	7,154.8	0.430	-0.385	-0.749	-0.888	-0.612	0.167	-0.076	-0.019
Median Coefficient	-0.273	-0.384	-835.3	0.367	-0.407	-0.656	-0.800	-0.617	0.324	-0.024	-0.030
Fama–MacBeth t-stat	-1.64	-7.99	1.20	2.42	-5.17	-3.79	-4.43	-2.72	1.09	-1.10	-0.30
Unsystematic Turnover (α_0):											
Mean Coefficient	0.052	-0.019	-5,510.6	-0.085	-0.083	-0.029	0.098	0.546	-0.219	0.054	-0.024
Median Coefficient	0.060	-0.033	-721.3	-0.139	-0.150	-0.159	0.100	0.282	-0.148	0.012	0.010
Fama–MacBeth t-stat	0.43	-0.50	-1.24	-0.96	-0.92	-0.17	0.44	2.07	-1.49	0.91	-0.71

Table 7
Average parameter values from monthly cross-sectional regressions of relative spreads on a rural dummy, market value, log of market value, number of analysts, inverse of stock price, and four industry dummies, 1993-1995

In the regressions, the dependent variable is the average quoted or effective relative spread for firm *i* in month *j*. Relative spreads for each trade are calculated by dividing the quoted (effective) spread by the contemporaneous average of the bid and ask prices. The nine explanatory variables are a dummy variable equal to one if the firm is located in a rural location (else zero), the market value two days prior to calendar month *j* (shares outstanding times stock price), natural logarithm of the market value, the number of analysts covering the stock, the reciprocal of the mean price during the month, and dummy variables for manufacturing, banking, transportation, and mining industries (else zero). Small firms are defined as firms with a market capitalization less than the median NYSE firms in a given year while large firms are firms with a market value equal or greater than the median NYSE firm. The cross-sectional regressions weight each month equally. The parameter values are the average of the cross-sectional regressions. In parentheses are the Fama-MacBeth autocorrelation-adjusted t-statistics. There are 36 months during January 1993-December 1995.

$$\text{Spread}_{ij} = a_{0j} + a_1\text{Rural Dummy}_{ij} + a_{2j}\text{Market Value}_{ij} + a_{3j}\text{ Log(Market Value)}_{ij} + a_{4j}\text{Number Analysts}_{ij} + a_{5j}(1/\text{Price})_{ij} + a_{6j}\text{Manufacturing Dummy}_{ij} + a_{7j}\text{Bank Dummy}_{ij} + a_{8j}\text{Transportation Dummy}_{ij} + a_{9j}\text{Mining Dummy}_{ij} + e_{ij}$$

Panel A. Nasdaq Stocks

Row	Relative Spread Measure	Intercept	Rural Dummy	Mkt Value	Log (Mkt Value)	Number Analysts	1/Price	Mfg. Dummy	Bank Dummy	Transp. Dummy	Mining Dummy	$R^2_{adj.}$
(1)	Quoted Spread	23.08	0.49	4.21	-1.64	-0.03	5.49	-0.04	0.30	0.08	0.22	0.395
		(11.70)	(12.89)	(4.47)	(-10.59)	(-4.52)	(3.38)	(-1.11)	(1.64)	(0.94)	(2.21)	
(2)	Effective Spread < 500 Shares	18.43	0.34	3.32	-1.30	-0.03	7.79	-0.05	0.04	0.06	0.14	0.396
		(22.03)	(7.97)	(5.54)	(-20.49)	(-6.31)	(9.56)	(-1.75)	(0.37)	(0.97)	(1.35)	
(3)	Effective Spread 500 – 1,000 Shrs	14.76	0.27	2.79	-1.06	-0.02	8.09	-0.01	0.09	0.09	-0.04	0.381
		(20.91)	(14.08)	(6.37)	(-18.12)	(-5.95)	(12.35)	(-0.40)	(0.90)	(1.26)	(-1.01)	
(4)	Effective Spread > 1,000 Shares	12.96	0.20	2.59	-0.93	-0.02	8.33	-0.02	0.11	0.10	-0.05	0.369
		(26.68)	(8.25)	(6.17)	(-23.60)	(-6.28)	(15.01)	(-0.95)	(1.33)	(2.24)	(-1.00)	

Panel B. NYSE/Amex Stocks

Row	Relative Spread Measure	Intercept	Rural Dummy	Mkt Value	Log (Mkt Value)	Number Analysts	1/Price	Mfg. Dummy	Bank Dummy	Transp. Dummy	Mining Dummy	$R^2_{adj.}$
(1)	Quoted Spread	2.42	0.01	0.12	-0.15	-0.01	13.10	0.02	0.04	-0.04	-0.01	0.868
		(23.02)	(0.36)	(5.89)	(-20.22)	(-1.04)	(22.87)	(0.49)	(0.42)	(-0.34)	(-0.29)	
(2)	Effective Spread < 500 Shares	1.86	0.01	0.11	-0.12	-0.00	9.25	0.00	0.04	-0.01	0.00	0.804
		(9.56)	(0.91)	(16.15)	(-9.67)	(-0.69)	(36.50)	(0.60)	(4.95)	(-1.29)	(0.08)	
(3)	Effective Spread 500 – 1,000 Shrs	2.87	-0.02	0.14	-0.20	0.00	8.69	0.00	0.06	-0.02	-0.03	0.820
		(15.54)	(-8.16)	(10.76)	(-16.63)	(9.41)	(54.34)	(1.02)	(9.23)	(-3.48)	(-2.29)	
(4)	Effective Spread > 1,000 Shares	3.00	-0.03	0.15	-0.21	0.00	9.60	0.01	0.06	-0.01	-0.04	0.785
		(20.85)	(-7.37)	(11.66)	(-19.99)	(5.29)	(54.57)	(2.62)	(5.93)	(-1.08)	(-2.70)	

Table 8
Determinants of the number of market makers for Nasdaq stocks May-December 1995

For each month the number of market makers, number of large market makers, and Herfindal index for each Nasdaq stock is regressed on a dummy variable for rural location and other explanatory variables. Number of market makers is the number that reported any volume as a market maker for the month. Small and large firms are smaller / larger than the median capitalization at the month's beginning. Large market makers made markets in at least 200 stocks during the month. The Herfindahl index for each stock is calculated by summing the squared percentage of shares traded by each market maker. Market value is the product of shares outstanding and price at the month's start. Volatility is the mean daily squared return for the prior twelve months. Volume is the mean daily volume for the prior twelve months. Return is the cumulative return over the prior twelve months. The rural dummy takes a value of one if the company headquarters is least 100 miles from any metropolitan area of one million or more. Urban firms have headquarters within one of the ten largest metropolitan areas of the U.S. Other firms are omitted. The average coefficients across the eight months are reported in the table with the average t-statistics in parentheses. R^2 is the average R^2 across the eight regressions.

	Dependent Variables		
	Number of Market Makers	Number of Large Market Makers	Herfindahl Index
Intercept	-15.81	-15.74	0.80
	(-5.31)	(-6.80)	(13.29)
Rural Dummy	-2.34	-1.61	0.05
	(-7.22)	(-6.94)	(4.61)
Log(Market Value)	2.38	2.12	-0.05
	(10.29)	(11.97)	(-10.57)
Volatility	34.67	28.48	-0.74
	(2.57)	(2.60)	(-2.62)
Volume	11.87	8.21	0.01
	(2.18)	(2.08)	(0.60)
Return	-1.10	-0.78	0.01
	(-4.22)	(-5.15)	(0.95)
Manufacturing Dummy	0.44	0.41	-0.02
	(1.23)	(1.60)	(-1.90)
Banking Dummy	-1.93	-1.86	0.04
	(-4.48)	(-5.82)	(3.44)
Transportation Dummy	0.31	0.12	0.01
	(0.36)	(0.24)	(0.71)
Mining Dummy	1.39	0.85	-0.01
	(1.99)	(1.86)	(-0.31)
R^2	0.332	0.413	0.168
Observations	1,852	1,852	1,852

Table 9
Changes in turnover around listing on the NYSE or Amex from Nasdaq, 1983-2002.

Average daily turnover is calculated for urban and rural stocks moving from Nasdaq to the NYSE or Amex using either six months or one year before and after listing. The turnover difference is the mean daily turnover after listing minus the mean daily turnover before. The rural dummy takes a value of one for companies located at least 100 miles from any metropolitan areas of one million or more. The market capitalization is computed on the first day the tock trades on the NYSE or Amex. The difference in volatilities is the standard deviation of daily stock returns after listing minus the standard deviation of daily returns before. The market turnover difference is the mean daily turnover of the equal-weighted portfolio of all listed and Nasdaq stocks after the stock lists minus the mean daily return before.

$$Turnover\ Diff_i = \alpha_0 + \alpha_1 Rural_i + \alpha_2 Log(Mkt.Cap)_i + \alpha_3 \mathrm{Re}turn\ Before_i + \alpha_4 \mathrm{Re}turn\ After_i + \alpha_5 \sigma\ Diff_i + \alpha_6 Turnover\ Diff_{Mkt} + \varepsilon_i$$

Row	Intercept	Rural Dummy	Log (Mkt Value)	Mean Daily Return Before	Mean Daily Return After	Difference in Volatility	Market Turnover Difference	R^2
				Six Months Before and After Listing				
(1)	-2.65	1.25						
	(-13.92)	(3.40)						0.012
(2)	5.61	1.42	-1.59	-102.6	185.0			
	(5.20)	(3.94)	(-7.23)	(-1.70)	(2.59)			0.115
(3)	5.69	1.44	-1.61	-100.0	187.4	27.21	0.02	
	(5.19)	(3.97)	(-7.20)	(-1.63)	(2.53)	(0.38)	(0.05)	0.115
				One Year Before and After Listing				
(4)	-2.60	1.29						
	(-11.70)	(3.19)						0.011
(5)	4.10	1.34	-1.33	12.18	297.2			
	(3.66)	(3.37)	(-5.82)	(0.18)	(3.50)			0.069
(6)	4.12	1.34	-1.32	11.91	300.6	8.10	-0.21	
	(3.62)	(3.31)	(-5.69)	(0.18)	(3.39)	(0.17)	(-0.46)	0.069