THE JOURNAL OF FINANCE • VOL. LXI, NO. 4 • AUGUST 2006

# Does Corporate Headquarters Location Matter for Stock Returns?

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**ABSTRACT**

We document strong comovement in the stock returns of firms headquartered in the same geographic area. Moreover, stocks of companies that change their headquarters location experience a decrease in their comovement with stocks from the old location and an increase in their comovement with stocks from the new location. The local comovement of stock returns is not explained by economic fundamentals and is stronger for smaller firms with more individual investors and in regions with less financially sophisticated residents. We argue that price formation in equity markets has a significant geographic component linked to the trading patterns of local residents.

FINANCIAL ECONOMISTS DOCUMENT A STRONG bias in the portfolio holdings of various classes of investors towards local companies.[1] However, researchers tend to disagree about the underlying reasons for such a bias with possible explanations varying from observational learning and the social interactions of investors (e.g., Brown et al. (2004)) to asymmetric information (e.g., Coval and Moskowitz (2001)). Despite the increased interest in investors' location-related preferences, the economic implication of locality for the pricing of publicly traded equity remains a largely unexplored question. If locality matters for asset pricing, then geography, in general, and the local bias, in particular, could have important implications for cost of capital calculations, performance evaluations, and asset allocation decisions.

This paper explores whether locality affects the covariance structure of underlying security returns. We find that stock returns of companies headquartered in the same geographic area (location) exhibit a strong degree of comovement. Moreover, stocks of companies that change their headquarters location experience a decrease in their comovement with stocks from the old location and an increase in their comovement with stocks from the new location. This local

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[1] Coval and Moskowitz (1999) document a strong preference of professional money managers towards stocks of firms that are locally headquartered. Brown et al. (2004) find that proximity to publicly traded firms increases equity market participation of individual investors. Outside of the United States, Grinblatt and Keloharju (2001) find that investors in Finland are more likely to invest in firms that are geographically close to them, and Feng and Seasholes (2002) show the same for China.

stock price comovement is unexplained by comovement in underlying fundamentals and is stronger in smaller, less profitable companies, in firms with more individual investors, and in regions with less financially sophisticated residents.

We measure the local comovement of a stock by the time-series sensitivity (beta) of its returns to the returns of an index of stocks headquartered in the same geographic area. When estimating local comovement we control for comovement with both the overall market and the corresponding industry groups. The latter is particularly important given that many industries tend to cluster geographically in order to benefit from the positive externalities of geographic proximity (see Marshall (1980) and Glaeser et al. (1992)). As an additional robustness test, we also identify a subsample of firms that change the location of their headquarters for nonmerger-related reasons in the mid 1990s. We find that before the move, these companies exhibit strong comovement with other companies from their old location, whereas they exhibit insignificant comovement with companies from the new location. After the move, however, their comovement with the old location halves, while their comovement with the new location increases significantly.

We consider two general explanations of the local comovement of stock returns, namely, fundamentals and geographic segmentation. First, since many firms operate regionally, it is possible that local economic conditions affect the fundamentals of local firms, thereby generating comovement in their stock prices. We show, however, that this is not the case. As a first test of the link between the local comovement of stock returns and fundamentals, we consider the local comovement in corporate earnings. We do not find that earnings changes of companies headquartered in the same geographic area exhibit any local comovement. Although the local comovement of stock prices could stem from fundamental information not yet incorporated into current earnings, such common information flow would be eventually reflected in future earnings. As a result, examining long-term correlations in earnings is a powerful methodology for detecting commonality in fundamentals.

As a second test of the link between the local comovement of stock returns and fundamentals, we consider a composite measure of monthly economic activity at the state level. We show that this state economic variable exhibits some explanatory power over stock returns. The magnitude of this effect, however, is too small to account for the strong comovement of stock returns from the same geographic area. While the state-level economic variable represents a noisy proxy of regional fundamentals and an extended list of local variables might be able to explain more of the local comovement of stock returns, it is unlikely that local fundamentals can explain all of the local comovement in stock prices.

An alternative explanation of local comovement is the geographic segmentation of domestic capital markets. The tendency of investors to overweight local companies in their portfolios is well documented in the academic literature. For example, Coval and Moskowitz (1999) find that professional money managers demonstrate strong preferences towards stocks of firms that are locally headquartered. Ivkovic and Weisbenner (2004) and Zhu (2002) uncover similar patterns for individual investors. The physical proximity of investors within a particular geographic area enables social interaction that promotes the transmission of investment sentiment and information among members of the community. This local exchange, together with the tendency of investors to hold local stocks, could generate correlated trading patterns in stocks from the same region. The latter would result in comovement in local stock returns that generally is not supported by comovement in fundamentals.

Our results are consistent with the geographic-segmentation view on local comovement. We find that the local comovement of a stock is stronger for companies that have been shown to have a larger fraction of local investors, such as small companies (see Coval and Moskowitz (1999) and Ivković and Weisbenner (2004)). This comovement is also stronger for firms that are less visible, such as less profitable firms and firms with fewer shareholders. Local comovement is further related to local economic and demographic characteristics. In particular, it is positively related to the financial market participation of local investors and inversely related to measures of the financial sophistication of local residents.

Since corporate headquarters are the center of information exchange between the firm and its investors (Davis and Henderson (2004)), local investors might enjoy an advantage in discovering local information first. Consistent with this view, Coval and Moskowitz (2001) and Ivković and Weisbenner (2004) argue that institutional and individual investors exploit local knowledge, since locals realize better performance in local stocks. Malloy (2005) and Orpurt (2004) find further that financial analysts are more accurate in their earnings forecasts of local firms, while Kedia and Panchapagesan (2004) show that geographic proximity is an informational advantage in acquisitions. We note that although local information production could explain the local bias of investors reasonably well, it could explain the local comovement of stock returns only if this information is systematic in nature. Given the weak relation between stock returns and local fundamentals, however, it is unlikely that local systematic information could successfully account for the local comovement of stock returns.

It is possible that our results may be better explained by correlated trading patterns of local residents that are unrelated to information. Such trading behavior could arise for a variety of reasons. First, some investors might follow others because they mistakenly believe that the actions of others contain information (see Bikhchandani, Hirshleifer, and Welch (1992)). Investors might also derive utility from talking about the stock market and sharing their trading experience with members of the community. In support of this view, Hong, Kubik, and Stein (2003) document a local "word-of-mouth" effect in the trades of money managers. Similarly, Hong, Kubik, and Stein (2004) show that more social individuals tend to participate more in the stock market than less social individuals, and Brown et al. (2004) find that individual investors influence each other in their investment decisions and that this influence is stronger for less financially sophisticated households and among investors with similar age and income levels. Finally, Benartzi (2001) shows that 401(k) investment behavior is driven by familiarity and that it does not seem related to information, since allocations to company stock do not predict future performance.

The geographic segmentation explanation of local comovement may not contradict investor rationality. For example, DeMarzo, Kaniel, and Kremer (2004) explore a model in which investor portfolio choice is strongly influenced by local factors. Since within each community investors compete for scarce local resources, these authors show that, in equilibrium, investors herd into and out of local securities. This trading behavior creates strong community-level systemic risk that is unrelated to fundamentals and that leads to underdiversification of local residents. Indeed, the tendency to herd might be so strong that it prevents conformist behavior such as arbitrage trading from arising.

We show that price formation in equity markets has a significant regional component. Therefore, our results have direct implications for efficient diversification, performance evaluation, and cost of capital calculations. For example, the existence of a local component in stock returns implies that geography might be an important consideration for achieving efficient diversification. The local comovement of stock returns also makes the local bias of investors even more puzzling, given that their labor income has a strong local component. Our results suggest that the social costs of underdiversification, for example in 401(k) pension plan investments (see Benartzi (2001)), might be higher than previously thought.

The paper is organized as follows. Section I discusses the data. Section II documents the local comovement of stock returns. Section III studies the link between local comovement and fundamentals and Section IV explores the determinants of local comovement. We conclude in Section V.

## I. Data and Descriptive Statistics

Our study includes domestic common stocks traded on the NYSE, AMEX, and NASDAQ, excluding REITs, closed-end funds, and ADRs, over the period from 1988 to 2002. Following Coval and Moskowitz (1999), Ivković and Weisbenner (2004), and Loughran and Schultz (2004), we define a firm's location as the location of its headquarters. This choice is reasonable given that corporate headquarters are close to corporate core business activities. More importantly, corporate headquarters are the center of information exchange between the firm and its suppliers, service providers, and investors (see Davis and Henderson (2004) for a detailed discussion of the role of corporate headquarters).

To classify locations, we first obtain the state and county associated with companies' headquarters from the COMPUSTAT annual files. The state/county combination defines the state/county code according to the Federal Information Processing Standards (FIPS). Using the state/county FIPS code, we then merge the sample of firms with the Metropolitan Areas and Components data defined by the Office of Management and Budget (OMB) as of 1993.[2] We define a firm's

[2] OMB defines Metropolitan Statistical Areas (MSA) for purposes of collecting, tabulating, and publishing federal data. MSA definitions result from applying published standards to Census Bureau data. MSAs are redefined every 10 years after each census even though changes in recent revisions have been small.

location as the Metropolitan Statistical Area (MSA) of its headquarters. As defined by the OMB, an MSA consists of a core area that contains a substantial population nucleus, together with adjacent communities that have a high degree of social and economic integration with that core. MSAs include one or more entire counties,[3] and some MSAs contain counties from several states. For example, the New York MSA includes counties from four states, New York, New Jersey, Connecticut, and Pennsylvania. As we discuss below, we include in our sample only firms from areas with at least five publicly traded firms in at least two different industry groups. Throughout the paper, we also refer to these MSAs as *areas* or *regions*.

One problem with the COMPUSTAT location data is that COMPUSTAT only reports the *current* state and county of firms' headquarters. To correct for this deficiency we cross-check the historic record of firms' headquarters information from Compact Disclosure. Unlike COMPUSTAT, Compact Disclosure provides information on the city and state of a firm's headquarters location on an annual basis over the period from 1988 to 2002. Using the Compact Disclosure data, we identify all firms whose corporate headquarters have moved from one location to another over the period and delete all firm-year observations prior to the relocation from the main sample.[4] In Section II, however, we specifically examine the effect of headquarters relocation on a firm's comovement for a subsample of relocating firms.

Table I presents summary statistics for the firms and MSAs in our sample at the beginning, middle, and end of the sample period. Panel A provides the total number of firms and MSAs in the sample as well as the distribution of the number of firms within a region. The total number of firms varies over time: At the beginning of the sample period, there are 4,131 firms while at the middle of the sample period, there are 5,122 firms.

There are 272 MSAs in 1993. However, more than half of the MSAs do not host any publicly traded firms. In fact, there are only 81–95 different MSAs that have at least five publicly traded firms over the sample period. The average MSA has around 50 firms operating in the area, while the median number of firms is less than 20. Since we exclude areas with fewer than five firms from the sample, the smallest areas, by design, include at least five firms.

Throughout the sample period, the New York metropolitan area has the largest number of publicly traded firms with approximately 700 firms. For years 1995 and 2002, the other top areas based on number of firms are San Francisco, Los Angeles, Boston, and Chicago, in descending order. These are also the five largest areas for year 1988, with the only difference being that San Francisco is ranked number four instead of number two during that year. The climb of the San Francisco area in the ranking is likely driven by the growth in the technology sector during the 1990s.

[3] MSAs in New England are defined using cities and towns instead of counties.

[4] Since Compact Disclosure data report the state/city rather than the FIPS code of the state/county of a firm's location, it is potentially difficult to merge this pre-relocation data with COMPUSTAT nonmanually. As a result, we delete the pre-relocation observations from the main sample.

**Table I**
**Summary Statistics**

Panel A of the table provides the total number of firms and Metropolitan Statistical Areas (MSAs) in the sample as well as the distribution of the number of firms per MSA for 1988, 1995, and 2002. Panel B of the table reports the distribution of the total number of industries in each MSA for the same years. The sample includes domestic common stocks traded on NYSE, AMEX, and NASDAQ from 1988 to 2002 with coverage in Compact Disclosure. We exclude REITs, closed-end funds, and ADRs. For all firms that relocated their headquarters over the period, we also exclude all firm-months before the relocation.

Panel A

| | | | Number of Firms per MSA | | | |
|---|---|---|---|---|---|---|
| Year | Number of Firms | Number of MSA | Mean | Median | Min. | Max. |
| 1988 | 4,131 | 86 | 48 | 16 | 5 | 769 |
| 1995 | 5,122 | 95 | 54 | 19 | 5 | 783 |
| 2002 | 4,205 | 81 | 52 | 18 | 5 | 622 |

Panel B

| | | Number of Industries per MSA | | | |
|---|---|---|---|---|---|
| Year | Number of Industries | Mean | Median | Min. | Max. |
| 1988 | 48 | 15 | 12 | 3 | 47 |
| 1995 | 48 | 15 | 12 | 4 | 44 |
| 2002 | 48 | 14 | 11 | 3 | 42 |

Panel B of Table I presents the distributional characteristics of 48 major industry groups within the regions. We define the 48 industries following Fama and French (1992), although our results are robust to an alternative industry definition based on two-digit SIC codes. We observe from the table that the metropolitan areas in the sample are well diversified across industries: The average number of industries per MSA is around 15, with a median of 12. Again, the New York MSA has the largest number of industries, followed by Chicago and Los Angeles, in all three sample years.

## II. Headquarters Location and the Comovement of Stock Returns

### *A. The Local Comovement of Stock Returns*

We begin our analysis by examining the degree of comovement of a stock with other stocks from the same MSA. We first construct a set of local stock return indices for each MSA by equally weighting the returns of all stocks within each region.[5] Afterwards, we estimate the following stock-level time-series regression:

[5] Equal weighting allows us to address better the question of how a particular stock comoves with other stocks within the same region, especially for areas with relatively few stocks and areas in which a small number of large stocks dominate the aggregate market capitalization of the region. We also replicate our tests by using a value-weighted local index and the results, although slightly weaker, are qualitatively similar.

$$R_t = \alpha_i + \beta^{LOC} R_t^{LOC} + \beta^{MKT} R_t^{MKT} + \varepsilon_{i,t}. \quad (1)$$

Here, $R_t$ is the monthly return of a particular stock, $R_t^{LOC}$ is the monthly return of the stock's corresponding MSA index, and $R_t^{MKT}$ is the monthly return of the market portfolio.[6] All returns are in excess of monthly T-bill rates. To avoid spurious correlations, when calculating the return on the MSA index, $R_t^{LOC}$, we exclude the return of the corresponding stock. The market portfolio return is included in the regression to control for overall market-wide comovement. The latter is particularly important, given that local stock prices are naturally influenced by market-wide information.

Industries tend to cluster geographically.[7] This tendency is also evident from our headquarters location data. For example, in our sample, more than half of the San Francisco MSA's publicly traded firms are in computer-related industries, while nearly half of all publicly traded firms in the Houston area are in the oil industry. In order to control for industry effects, we modify equation (1) by introducing an equally weighted industry index of the stock's corresponding industry group, that is,

$$R_t = \alpha_i + \beta^{LOC} R_t^{LOC} + \beta^{MKT} R_t^{MKT} + \beta^{IND} R_t^{IND} + \varepsilon_{i,t}, \quad (2)$$

where $R_t^{IND}$ is the return of the stock's corresponding industry.

We use the industry classification of Fama and French (1992) to assign stocks into 48 industry groups. We also replicate all of our tests using two-digit SIC codes to classify industries, with no changes to the major results. We choose to work with an equally weighted industry index in order to be consistent with the way the local index is constructed. In unreported results, we find that a value-weighted industry index exhibits substantially smaller explanatory power with regards to the time-series variation of stock returns, which makes the significance of the local index even stronger.

Equation (2) may not be able to control completely for the impact of industry geography on local stock price comovement. One concern is that the CRSP industry classification may not accurately describe the business relation between a firm and its industry group. It is also possible that even with an "accurate" industry classification, regional industry effects generate spillovers across multiple industries. Thus, a firm might comove not only with local firms in the same industry but also with local firms in related industries. To provide a more detailed industry control, we extend equation (2) by including on the right-hand side the returns of additional industries whose returns are correlated with the returns of the stock, that is,

$$R_t = \alpha_i + \beta^{LOC} R_t^{LOC} + \beta^{MKT} R_t^{MKT} + \beta^{IND} R_t^{IND} + \sum_{K=1}^{2} \beta^{IND_K} R_t^{IND_K} + \varepsilon_{i,t}. \quad (3)$$

[6] We also estimate a version of equation (1) excluding all stocks from the stock's MSA when constructing the market index and all results are qualitatively similar.

[7] See Ellison and Glaeser (1997) and the reference therein.

Here, $R_t^{LOC}$ is the return of the corresponding local index, $R_t^{MKT}$ is the return of the market portfolio, $R_t^{IND}$ is the return of the stock's corresponding industry, and $R_t^{IND_1}$ is the return of the industry that explains best the return of the stock from among the remaining 47 industries over the previous 5-year period, as measured by the $R^2$ from the regression

$$R_t = \alpha_i + \beta_1 R_t^{IND_1} + \varepsilon_{i,t}. \tag{4}$$

After specifying $IND_1$, we similarly identify industry $IND_2$ from among the remaining 46 industries as the industry that maximizes the $R^2$ from the following regression:

$$R_t = \alpha_i + \beta_1 R_t^{IND_1} + \beta_2 R_t^{IND_2} + \varepsilon_{i,t}. \tag{5}$$

The resulting pair of industry returns ($R_t^{IND_1}$, $R_t^{IND_2}$) serves as an additional control for industry-related comovement of stock returns.[8]

We estimate equations (1)–(3) as time-series regressions over three different periods, 1988 to 1992, 1993 to 1997, and 1998 to 2002, which requires at least 24 nonmissing monthly return observations. Averages of the estimated coefficients (betas) and their $t$-statistics are presented in Table II.

We observe that stock local betas, $\beta^{LOC}$, are significantly positive in all three specifications. Local betas also exhibit strong economic significance: Average betas with respect to the local index are between 0.45 and 0.83 over the various models and subperiods. The first panel of the table also indicates that in the presence of a local factor, the significance of the market index is substantially weaker: Average market betas are between 0.19 and 0.24, while average local betas are more than three times higher.

The second panel of the table shows that the comovement results are not driven by stock comovement with firms from the same industry. Industry betas are strongly significant (industry comovement appears stronger in the later periods). Although the introduction of industry indices reduces the magnitude and significance of local betas, local betas still remain highly economically and statistically significant: Average local betas are between 0.45 and 0.54 across the three subperiods.

Adding more related industries in the regression also does not change substantially the magnitude and significance of the local stock index. Interestingly, the industries whose returns generate the highest explanatory power over individual stock returns (in terms of $R^2$) tend to be negatively correlated with the stock after controlling for the stock's SIC-defined industry. As a result, the inclusion of these industries on the right-hand side makes the significance of both

[8] To ensure robustness of the results, we also use alternative methods to identify the industries whose returns are most closely associated with individual firm returns. For example, we select three industries from all 48 industries using regressions similar to equations (4) and (5). In addition, we run regressions (4) and (5) including a firm's own industry on the right-hand side. Separately, we identify the second industry (*IND*2) in (5) from a univariate regression similar to the way we identify *IND*1 in equation (4). We also use correlations, instead of $R^2$, as a criterion for selecting *IND*1 and *IND*2. All results are similar.

**Table II**

## Local Comovement

For each stock in the sample, we estimate three time-series regressions of monthly stock returns on the returns of a local index, the market portfolio, and industry indices for three 5-year periods: 1988–1992, 1993–1997, and 1998–2002. Cross-sectional averages of the estimated coefficients (betas) from the time-series regressions and their $t$-statistics are presented in the table. The local index is constructed as the equally weighted return of all stocks from the firm's corresponding MSA, excluding the firm itself. The market index is the value-weighted return of all stocks in the market. $R_t^{IND}$ is the equally weighted return of the stock's corresponding industry, according to the Fama and French 48-industry classification; $R_t^{IND_1}$ is the return of the industry that explains best the returns of the stock out of the remaining 47 industries over the previous 5-year period in terms of the highest $R^2$ (equation (4) in the text); and, $R_t^{IND_2}$ is the second-best industry out of the remaining 47 industries that generates the highest $R^2$ from the regression of the returns of the stock on the returns ($R_t^{IND_1}$, $R_t^{IND_2}$) (equation (5) in the text). The sample includes domestic common stocks traded on NYSE, AMEX, and NASDAQ from 1988 to 2002 with coverage in Compact Disclosure. We exclude REITs, closed-end funds, and ADRs. For all firms that relocated their headquarters over the period, we also exclude all firm-months before the relocation.

| | $\beta^{LOC}$ | $\beta^{MKT}$ | $\beta^{IND}$ | $\beta^{IND_1}$ | $\beta^{IND_2}$ |
|---|---|---|---|---|---|
| Model 1 | | | | | |
| 1988–1992 | 0.760 | 0.203 | | | |
| $t$-stat | 37.06 | 8.40 | | | |
| 1993–1997 | 0.715 | 0.238 | | | |
| $t$-stat | 50.42 | 13.72 | | | |
| 1998–2002 | 0.817 | 0.198 | | | |
| $t$-stat | 51.93 | 10.79 | | | |
| Model 2 | | | | | |
| 1988–1992 | 0.545 | −0.135 | 0.637 | | |
| $t$-stat | 22.58 | −5.16 | 29.40 | | |
| 1993–1997 | 0.532 | −0.168 | 0.710 | | |
| $t$-stat | 27.37 | −9.04 | 43.15 | | |
| 1998–2002 | 0.459 | −0.087 | 0.735 | | |
| $t$-stat | 23.08 | −4.65 | 44.34 | | |
| Model 3 | | | | | |
| 1988–1992 | 0.657 | −0.119 | 0.795 | −0.153 | −0.141 |
| $t$-stat | 22.18 | −4.72 | 26.65 | −5.77 | −5.49 |
| 1993–1997 | 0.628 | −0.120 | 0.803 | −0.081 | −0.159 |
| $t$-stat | 26.29 | −6.19 | 34.50 | −3.55 | −7.88 |
| 1998–2002 | 0.575 | −0.078 | 0.901 | −0.136 | −0.173 |
| $t$-stat | 23.37 | −3.89 | 41.24 | −5.78 | −8.39 |

the local index and the firm's original industry even stronger. We also replicate the same tests with the industries whose returns have the highest (positive) correlations with the returns of the stock; the inclusion of these industries yields similar results.

As an additional robustness test of local comovement, we estimate Table II excluding New York—the largest MSA in the sample. This test is motivated by the fact that New York accommodates all three major stock exchanges in the United States and trading location matters for stock returns (see Froot and Dabora (1999) and Chan, Hameed, and Lau (2003)). To evaluate the impact of agglomeration of corporate headquarters on the comovement results, we also replicate our tests excluding the five largest MSAs in the sample. The results are very similar to those reported in Table II. We note, however, that local comovement appears stronger in larger MSAs. In Section IV, we examine in detail the cross-sectional determinants of local comovement in terms of both firm and regional characteristics.

### *B. Headquarters Relocation and Changes of Local Comovement*

So far, we have found that stock returns of firms headquartered in the same geographic area exhibit a strong degree of comovement. In this subsection, we study the change in local comovement for a subset of relocating firms in the early-to-mid 1990s. The empirical analysis on the relocation sample provides a more rigorous control for firm characteristics potentially correlated with local comovement.

We construct our sample of relocating firms as follows. First, we identify firms that report different headquarters locations in two consecutive years in the Compact Disclosure database. Then, we manually verify each move using newspaper reports and wire reports from Factiva (a news report data service provided by Dow Jones News Service and Reuters). The majority of headquarters relocations are a result of corporate mergers and acquisitions or some other forms of major corporate restructuring. We exclude such firms from the relocation sample. We further eliminate firms that moved locally, that is, firms that moved their headquarters to a different city but still remained within the same MSA. In order to allow for 5-year estimation periods before and after relocation, we restrict the sample to corporate relocations occurring during the 1992 to 1997 period.

After matching the relocation sample with the CRSP and MSA data, our final sample of relocating firms consists of 118 firms. Most of the relocating firms in the sample are relatively small, although the sample does include some well-publicized moves, such as SBC's relocation from St. Louis to San Antonio and General Dynamics' relocation from St. Louis to Washington DC. The most commonly cited reasons for headquarters relocations by these firms are: to be close to customers; to reduce costs; to move to a more important production base area; and, to capture synergies with other local firms. For example, Southwestern Bell's chairman Edward E. Whitacre Jr. comments on the headquarters relocation of his company: "[It] will put us closer to more of our major growth markets and customers."[9] Similarly, General Dynamics' chairman William Anders argues "[T]he company can operate more effectively, more efficiently and be more responsive by having our headquarters and our leadership closer to our principal customers."[10]

[9] See "Southwestern Bell to Move Its Headquarters to Texas," page A10, *The Wall Street Journal*, September 29, 1992.

[10] See "No. 2 Defense Firm to Move To D.C. Area; General Dynamics Cites Pentagon Ties," page A1, *The Washington Post*, June 20, 1991.

More than half of the relocating firms moved out of MSAs that have a large number of publicly traded firms. For example, of the 118 relocating firms, 27 moved away from New York and 17 from Los Angeles, followed by Boston and San Francisco with eight moves each. In contrast, the relocating firms moved to relatively diverse regions. Only five relocating firms moved to New York in the sample. Ghosh, Rodriguez, and Sirmans (1995) argue that a large fraction of corporate headquarters relocations in the late 1980s were in and out of New York City. To control for a possible "New York City" effect in the sample of relocating firms, we estimate equations (6) and (7) excluding all stocks that relocate into or out of the New York MSA. All major inferences are qualitatively similar, indicating that our results are not driven primarily by New York.

For each relocating firm we estimate the following time-series regression for the 5 years prior to and the 5 years subsequent to the relocation, excluding the year of the move; that is,

$$R_t = \alpha_i + \beta^{LOCO} R_t^{LOCO} + \beta^{LOCN} R_t^{LOCN} + \beta^{MKT} R_t^{MKT} + \varepsilon_{i,t}. \tag{6}$$

Here $R_t^{LOCO}$ is the return of the local index from the old region (before the relocation), $R_t^{LOCN}$ is the return of the local index from the new region (after the relocation), and $R_t^{MKT}$ is the return on the market portfolio. Consistent with equation (1), here we also exclude the stock from the old local index before the move and from the new local index after the move.

We also consider an industry-adjusted version of equation (6)

$$R_t = \alpha_i + \beta^{LOCO} R_t^{LOCO} + \beta^{LOCN} R_t^{LOCN} + \beta^{MKT} R_t^{MKT} + \beta^{IND} R_t^{IND} + \varepsilon_{i,t}, \tag{7}$$

where $R_t^{IND}$ is the return of an equally weighted index of the stock's corresponding industry.

Table III reports the results on the relocation sample. The first two rows present the estimated betas with respect to the old and new location indices prior to the relocation. The next two rows report the estimated betas with respect to both location indices after the relocation. The bottom two rows of the table present the difference in the local betas before and after the relocation and test the statistical significance of the difference.

We observe first that before the relocation, the returns of all companies from our sample exhibit very strong sensitivity to the returns of firms in their current location. The result is consistent with the evidence we document earlier using the full sample. Interestingly, before the relocation, the firms exhibit no sensitivity to the returns of firms in the new location. This low comovement is somewhat surprising, given that the most often-cited reasons for relocation include being close to customers and achieving synergy with local firms. For the 5-year period after relocation, however, the sensitivity of the relocating firms to their new location becomes economically and statistically significant: Average betas to the new location index increase from 0.157 to 0.738 for the model in (6) and from 0.01 to 0.57 for the industry-adjusted model in (7). The difference in new-location betas before and after the move is also statistically significant, as reflected in the last row of the table.

**Table III**

**Headquarters Relocation and Local Comovement**

We identify a sample of 118 firms that change the geographic location of their headquarters for nonmerger-related reasons between 1992 and 1997 from Compact Disclosure. For each stock in the sample we estimate time-series regressions of monthly stock returns on the returns of the stock's old local index, the stock's new local index, and the market portfolio for two periods: the 5 years before the relocation and the 5 years after the relocation. In (1), we report averages of the estimated coefficients and their $t$-statistics. In (2), we report averages of the estimated coefficients and their $t$-statistics from an extended model that includes an industry index of the stock's corresponding industry group. The difference between the estimated pre- and post-relocation coefficients (betas) and their $t$-statistics are presented in rows 5 and 6.

| | (1) | | | (2) | | | |
|---|---|---|---|---|---|---|---|
| | $\beta^{LOCO}$ | $\beta^{LOCN}$ | $\beta^{MKT}$ | $\beta^{LOCO}$ | $\beta^{LOCN}$ | $\beta^{MKT}$ | $\beta^{IND}$ |
| Before relocation | 0.546 | 0.157 | 0.262 | 0.177 | 0.010 | −0.011 | 0.919 |
| $t$-stat | 4.10 | 1.71 | 0.48 | 1.52 | 0.07 | −0.09 | 7.82 |
| After relocation | 0.275 | 0.738 | 0.148 | −0.170 | 0.570 | −0.125 | 0.834 |
| $t$-stat | 2.43 | 5.82 | 1.40 | −1.42 | 3.24 | −0.91 | 5.21 |
| Difference | −0.271 | 0.581 | −0.114 | −0.347 | 0.561 | −0.113 | −0.085 |
| $t$-stat | −2.03 | 4.68 | −0.86 | −2.66 | 4.28 | −0.56 | −0.12 |

At the same time, after the relocation, the sensitivity of the relocating firm returns to the old location index is reduced in half—old-location betas in model (6) drop from 0.546 to 0.275, while old-location betas in the industry-adjusted model (7) drop from 0.177 to −0.17. In both cases, the decline in old-location betas is statistically significant. We note that the relocating firms in our sample do not alter significantly their production operations after the move, suggesting that the change in their comovement patterns is not related to fundamentals.

As discussed earlier, firms might relocate because the nature of their business has changed and they would like to be closer to their new suppliers or customers. In this case, a change in comovement between the old and the new locations would occur for business reasons that are not properly taken into account by the firm's industry index. To the extent these customer-supplier relationships might be picked up in cross-industry correlations, we also extend equation (7) by including the two additional industries that generate the highest explanatory power over an individual stock's returns before the move as well as after the move, following the methodology from the previous subsection. Consistent with this story, we observe that the choice of the two industries differs before and after the move. However, the change in local comovement for the relocating firms is not explained by these additional industry controls.

## III. Local Comovement and Local Fundamentals

In this section, we examine whether the local comovement of stock returns results from the comovement of firms' fundamentals. In the first subsection we concentrate on corporate earnings, while in the second and third subsections we analyze the impact of regional economic conditions on stock price comovement.

### *A. Is There a Local Comovement in Earnings?*

Since many, especially small, firms operate regionally, it is possible that local economic conditions affect local firms similarly and generate comovement of their stock prices. If the local comovement of stock prices is driven by fundamentals, then firms' cash flows would also exhibit strong regional comovement.

We use quarterly earnings as a proxy for firm cash flows. Considerable academic research, starting with Ball and Brown (1968), confirms the importance of accounting earnings for equity valuation.[11] We obtain data on corporate earnings from COMPUSTAT quarterly files. Earnings are measured before extraordinary items and discontinued operations. For each firm we then calculate the change of its current-quarter earnings relative to previous-quarter earnings and relative to same-quarter earnings from the previous year. The second measure controls for seasonality in quarterly earnings and is often referred to as seasonally differenced quarterly earnings. We further scale both earnings change variables by the corresponding book values of equity. The two earnings growth ratios are denoted by $dE/BE_1$ and $dE/BE_4$, respectively.

Based on the above two firm-level earnings growth variables, we construct both equally weighted and value-weighted market and local earnings growth indices, that is, $(dE/BE_k)^{LOC}$ and $(dE/BE_k)^{MKT}$, where $k = (1, 4)$. We construct value-weighted indices by weighting with book values of equity in order to be consistent with the construction of earnings-growth ratios. Here we also exclude each firm's earnings growth ratio from the local index.

We estimate the following time-series regression for each stock using both earnings growth measures $k = (1, 4)$:

$$dE/BE_k = \alpha_i + \beta^{LOC}(dE/BE_k)^{LOC} + \beta^{MKT}(dE/BE_k)^{MKT} + \varepsilon_{i,t}. \tag{8}$$

Equation (8) has the same structure as equation (1) except that here we replace stock return variables with earnings growth variables. Table IV estimates equation (8) over the sample period 1988 to 2002, excluding all firms with fewer than 16 quarterly observations. We also estimate the equation for the three subperiods (excluding estimates based on fewer than 10 quarterly observations); the results are qualitatively similar. The table reports cross-sectional means and medians of local earnings betas and market earnings betas. We use the Wilcoxon signed-ranks test to assess whether the medians of the estimated coefficients are significantly different from zero.

We uncover significant commonality in earnings growth rates but only at the market level. The market-wide comovement of corporate earnings is particularly strong for the value-weighted market index. After controlling for this market-wide comovement, we find that a firm's earnings comove negatively

[11] See Lev (1989) for a review.

**Table IV**
## Comovement of Earnings

For each stock in the sample, we estimate time-series regressions of its earnings growth rate on local and market earnings growth indices. We consider two earnings growth variables. The first one, $dE/BE1$, is constructed using earning changes from the previous quarter scaled by the lagged book value of equity, while the second one, $dE/BE4$, is constructed using earnings changes from the same quarter in the previous year scaled by the lagged book value of equity. The local earnings-growth index includes all stocks from the firm's corresponding MSA excluding the firm itself, and the market earnings growth index includes all stocks in the market. We consider both equally weighted and value-weighted indices. Mean (median) values of the estimated coefficients (betas) and their $t$-statistics ($p$-values) are presented in the table. The sample includes domestic common stocks traded on NYSE, AMEX, and NASDAQ from 1988 to 2002 with coverage in Compact Disclosure. We exclude REITs, closed-end funds, and ADRs.

| | Equally Weighted | | Value Weighted | |
|---|---|---|---|---|
| | $\beta^{LOC}$ | $\beta^{MKT}$ | $\beta^{LOC}$ | $\beta^{MKT}$ |
| *dE/BE1* | | | | |
| mean | −0.259 | 0.729 | −0.130 | 0.331 |
| $t$-stat | *−23.36* | *28.53* | *−8.31* | *8.33* |
| median | −0.038 | 0.136 | −0.019 | 0.201 |
| $p$-value | *0.00* | *0.00* | *0.00* | *0.00* |
| *dE/BE4* | | | | |
| mean | −0.203 | 1.600 | −0.111 | 0.141 |
| $t$-stat | *−29.09* | *54.80* | *−9.32* | *1.20* |
| median | −0.050 | 0.901 | −0.010 | 0.041 |
| $p$-value | *0.00* | *0.00* | *0.00* | *0.00* |

with both the value-weighted and equal-weighted local earnings indices. The medians of the estimates reveal the same pattern.

The lack of local comovement in firm earnings could be due to the fact that for many firms, earnings are generated outside of the geographic region of their headquarters. As a result, regional economic conditions would have limited impact on the fundamentals of these firms. However, in unreported results, we are unable to detect local earnings comovement even for a subsample of small stocks, which are much more likely to operate locally and be affected by local economic conditions.[12] We also note the possibility that local comovement of companies' earnings could be affected by local competition. This scenario, however, is also unlikely given that local competition would affect mostly stocks within the same industry groups and our results are robust to industry controls.

We recognize that local comovement of stock prices could stem from information unrelated to current earnings. We note, however, that such common fundamental information flow would be eventually reflected in future earnings. As a result, our methodology of estimating long-run correlations of companies' earnings is a powerful tool for detecting commonality in fundamentals.

[12] Our sample of small stocks includes all stocks with a market capitalization below the midpoint based on NYSE rankings.

Stock price changes are affected by innovations in both expected discount rates and expected future cash flows. However, innovations in expected discount rates account for a relatively small fraction of stock returns in comparison with innovations in expected cash flows (see Vuolteenaho (2002)). In the following subsections, we examine the relation between local economic fundamentals and stock returns. If expected discount rates have a regional component, then local economic instruments should be systematically related to regional stock returns.

### *B. Local Comovement and Local Economic Fundamentals*

In this subsection we examine whether the local comovement of stock returns is affected by local information about the overall employment and income level of the region. This complements the earnings analysis from the previous subsection, since employment and income variables represent important pieces of macroeconomic information and are closely related to aggregate market returns (see Jagannathan and Wang (1996)).

We measure local fundamentals using the consistent economic indices for the 50 states developed and provided by the Federal Reserve Bank of Philadelphia.[13] The state-level economic indices are constructed as a composite measure of monthly economic activity in the state. The state indices are constructed using the same input variables and methodology as the national coincident index for the U.S. economy developed by Stock and Watson (1989). Stock and Watson (1989) use a set of observable indicators of the economy to estimate a single unobserved dynamic factor—the underlying "state of the economy." The economic index is the latent factor estimated in a dynamic single-factor model using the Kalman filter based on three monthly economic variables, employment, unemployment, and average hours worked, and one quarterly economic variable, employment income.

One disadvantage of using this variable is that our local stock return indices are constructed at the MSA level, and thus the state economic index represents a noisy proxy of MSA economic activity. This problem is not severe, however, given that most MSAs in our sample represent important economic areas within a state. As a result, MSA economic activity should be highly correlated with state economic activity.[14] As a robustness check, we also replicate our tests for MSAs that dominate the economic activity in their respective states (for instance, Chicago, Atlanta, and Boston, among others) and the results are qualitatively the same. We also recognize that these state-level variables do not span all aspects of local fundamentals and the addition of other variables might be able to explain more of the local comovement of stock returns.

[13] The data series start in 1979 and include indices for all 50 states and an index for the nation. See Crone (2002) for details on the construction of the state economic indices.

[14] For MSAs that spread across multiple states, we assign the MSA to the state in which the main city of the MSA resides. For example, the New York MSA is assigned to the state of New York.

Given that stock prices are forward looking, we examine the relation between current stock returns and future local and national economic fundamentals.[15] For each stock in the sample, we regress the returns of the stock on returns of its corresponding local index, the market index, and the lead changes of its corresponding local fundamentals variable (LF) and national fundamentals variable (NF) over the following 3 months;[16] that is,

$$R_t = \alpha_i + \beta^{LOC} R_t^{LOC} + \beta^{MKT} R_t^{MKT} + LF_{t+1} + NF_{t+1} + \varepsilon_{i,t}. \tag{9}$$

The last column of Table V estimates equation (9). The other four columns estimate alternative specifications of (9) over subsets of the independent variables. For example, in the first column we regress the current return of the stock on future changes of local economic fundamentals, while in the second column we regress the current return of the stock on future changes of national economic fundamentals.

We observe that both local and national economic fundamentals exhibit significant explanatory power over stock returns. Consistent with the earnings results, we also show that all information in local fundamentals is subsumed completely by national fundamentals (specification (3) in Table V). When we include the returns of the local equity index on the right-hand side, both the local and national economic variables lose their statistical significance. In all specifications, the local index remains highly significant, suggesting that local comovement in stock prices cannot be explained by local fundamentals.

### C. Headquarters Relocation and Local Economic Fundamentals

We also examine the importance of local fundamentals for the comovement patterns of the sample of relocating firms by estimating the following equation before and after the relocation:

$$R_t = \alpha_i + \beta^{FO} LFO_{t+1} + \beta^{FN} LFN_{t+1} + \varepsilon_{i,t}, \tag{10}$$

where $R_t$ is the return of the stock over the current month, while $LFO_{t+1}$ and $LFN_{t+1}$ are the changes in local fundamentals for the new and old locations, respectively, over the following 3 months.

Average coefficients from the estimation of (10) before and after the relocation are presented in the first panel of Table VI. Before the relocation, the returns of all our sample companies exhibit no sensitivity to the fundamentals of either the old or the new location. Indeed, the sensitivity to the new location is negative. For the 5-year period after relocation, however, the sensitivity of the relocating firms' returns to the fundamentals of the new location becomes positive and marginally significant. The decline of the sensitivity of the returns of relocating

[15] See Stock and Watson (2003) for a survey on empirical studies on the relation between asset prices and economic activities.

[16] We decided to use three leading months after careful examination of the association between changes of the economic variables and stock returns. First, we verify that individual stock returns are not significantly related to past economic activities, both at the national and the local level. Results based on aggregation of economic fundamentals over 2-month and 5-month future periods are qualitatively similar to results based on the 3-month lead period.

**Table V**

## Comovement and Local Economic Fundamentals

For each stock in the sample we regress the returns of the stock on the returns of its corresponding local index, the market index, and lead values of the changes of its corresponding local economic fundamentals (LF) and national economic fundamentals (NF) over the following 3 months, as detailed in equation (9) in the text. The local economic fundamentals variable is the state economic index from the MSA's state, developed by the Federal Reserve Bank of Philadelphia. The national economic fundamental variable is the national economic index from the same data. The last column of the table estimates averages of the estimated coefficients and their $t$-statistics of equation (9). The first four columns estimate alternative specifications of (9) over subsets of the independent variables. The sample includes domestic common stocks traded on NYSE, AMEX, and NASDAQ from 1988 to 2002 with coverage in Compact Disclosure. We exclude REITs, closed-end funds, and ADRs.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Intercept | 0.005 | 0.005 | 0.005 | 0.006 | 0.003 |
| $t$-stat | *14.95* | *7.68* | *7.35* | *8.77* | *4.10* |
| Market index | | | | 1.014 | 0.178 |
| $t$-stat | | | | *100.10* | *12.40* |
| Local index | | | | | 0.776 |
| $t$-stat | | | | | *60.03* |
| National fundamentals | 0.100 | | 0.091 | 0.017 | 0.000 |
| $t$-stat | *24.53* | | *17.63* | *3.43* | *−0.02* |
| Local fundamentals | | 0.069 | −0.002 | −0.045 | −0.004 |
| $t$-stat | | *10.49* | *−0.28* | *−5.82* | *−0.46* |

firms to the fundamentals of the old location, combined with the increase of their sensitivity to the fundamentals of the new location suggests a change in the regional economic integration of relocating firms.

In the second panel of Table VI, we extend equation (10) by including on the right-hand side the returns of the old local stock index, the new local stock index, and the stock market index. Consistent with the results in the previous subsection, the significance of the local economic variables goes away. Again, changes of economic fundamentals do not explain changes in the local comovement of stock returns. It seems that the link between headquarters location and stock returns is more related to investor trading behavior than information.

## IV. Determinants of the Local Comovement of Stock Prices

The evidence thus far shows that stock returns exhibit a strong local component and the magnitude of the effect is too strong to be accounted for by economic fundamentals. In this section, we study the cross-sectional determinants of local comovement in terms of various firm and regional characteristics.

### *A. Local Comovement and Firm Characteristics*

First, we examine the cross-sectional variation in the local comovement of stock returns. We choose a set of firm characteristics that have been shown to be correlated with the local bias of various groups of investors. Specifically,

**Table VI**

**Headquarters Relocation and Local Fundamentals**

We identify a sample of 118 firms that change the geographic location of their headquarters for nonmerger-related reasons between 1992 and 1997. For each stock in the sample we estimate time-series regressions of monthly stock returns on lead values of changes of the stock's local economic fundamentals of the old location (LFO) and the new location (LFN) for two periods: the 5 years before the relocation and the 5 years after the relocation. The local economic variable is the state economic index from the MSA's state, developed by the Federal Reserve Bank of Philadelphia, and is measured over the following 3 months. In the first panel of the table, we report averages of the estimated coefficients and their $t$-statistics. In the second panel of the table, we report averages of the estimated coefficients and their $t$-statistics from an extended model that includes the returns of the old local stock index, the new local stock index, and the market portfolio.

| | $\beta^{MKT}$ | $\beta^{LOCO}$ | $\beta^{LOCN}$ | $\beta^{LFO}$ | $\beta^{LFN}$ |
|---|---|---|---|---|---|
| Model 1 | | | | | |
| Before relocation | | | | 0.056 | −0.060 |
| $t$-stat | | | | *0.82* | *−0.76* |
| After relocation | | | | −0.243 | 0.104 |
| $t$-stat | | | | *−1.96* | *1.71* |
| Model 2 | | | | | |
| Before relocation | 0.043 | 0.428 | 0.296 | 0.020 | −0.069 |
| $t$-stat | *0.33* | *3.84* | *2.08* | *0.28* | *−0.81* |
| After relocation | −0.067 | 0.203 | 0.829 | −0.299 | 0.064 |
| $t$-stat | *−0.57* | *2.19* | *6.68* | *−2.54* | *0.47* |

we consider the following firm characteristics as independent variables in the cross-sectional regressions derived from the COMPUSTAT annual files:

- *Size*—the natural logarithm of the market capitalization of the stock measured at the end of the previous year.
- *Leverage*—the ratio of total debt over assets.
- *Dividend Yield*—the annual cash dividend payout scaled by market capitalization.
- *Market-to-book*—the market-to-book equity ratio calculated as the market value of equity over the book value of equity.
- *ROA*—return on assets.
- *Advertising*—advertising expenditures in millions.
- *Number of Shareholders*—the natural logarithm of the number of shareholders.
- *Institutional Ownership*—the fraction of the number of shares held by institutional investors relative to the total number of shares outstanding derived from CDA/Spectrum.

All of the above independent variables are averaged over the corresponding 5-year periods. We run two different regression specifications. The first includes five firm-specific characteristics *Size, Leverage, Dividend Yield, Market-to-book,* and *ROA*, and the second includes additional variables related to the equity ownership of the firm *Number of Shareholders* and *Institutional Ownership*.

**Table VII**

**Cross-sectional Determinants of Local Comovement: Firm Characteristics**

For each stock in the sample, we estimate time-series regressions of monthly stock returns on the returns of a local index and the market portfolio for three 5-year periods: 1988–1992, 1993–1997, and 1998–2002. We then regress the estimated local beta on the following firm characteristics: Size, the natural logarithm of the market capitalization of the firm; Leverage, the total debt over assets ratio; Dividend Yield, the dividend payout divided by the market value of equity; Market-to-book, the market to book ratio; ROA, return on assets; Advertising, the natural logarithm of advertising expenditures; Advertising × Size, the natural logarithm of advertising expenditures interacted with size; Number of Shareholders, the natural logarithm of number of shareholders; and Institutional Ownership, the fraction of the number of shares held by institutional investors relative to the total number of shares. All independent variables are 5-year annual averages for the three periods. Estimated coefficients and their $t$-statistics are presented in the table. The sample includes domestic common stocks traded on NYSE, AMEX, and NASDAQ from 1988 to 2002 with coverage in Compact Disclosure. We exclude REITs, closed-end funds, and ADRs.

| | Full Sample | | 1988–1992 | | 1993–1997 | | 1998–2002 | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (1) | (2) | (1) | (2) | (1) | (2) |
| Int. 1988–1992 | 1.368 | 1.328 | 1.299 | 1.298 | | | | |
| | 47.60 | 44.72 | 25.57 | 24.06 | | | | |
| Int. 1993–1997 | 1.490 | 1.440 | | | 1.496 | 1.414 | | |
| | 49.49 | 45.34 | | | 34.41 | 30.28 | | |
| Int. 1998–2002 | 1.603 | 1.551 | | | | | 1.649 | 1.598 |
| | 50.04 | 46.09 | | | | | 35.76 | 33.36 |
| Size | −0.133 | −0.094 | −0.125 | −0.117 | −0.141 | −0.094 | −0.135 | −0.092 |
| | −27.02 | −11.27 | −11.89 | −5.75 | −18.00 | −6.86 | −17.43 | −7.61 |
| Leverage | −0.243 | −0.221 | −0.074 | −0.091 | −0.204 | −0.168 | −0.438 | −0.394 |
| | −5.57 | −5.05 | −0.92 | −1.12 | −2.44 | −2.01 | −6.49 | −5.81 |
| Dividend yield | 0.000 | 0.000 | −0.503 | −0.506 | 0.002 | 0.003 | −0.002 | −0.002 |
| | 0.02 | 0.05 | −2.11 | −2.11 | 0.47 | 0.61 | −0.40 | −0.44 |
| Market-to-book | 0.000 | 0.000 | 0.001 | 0.001 | 0.004 | 0.004 | 0.000 | 0.000 |
| | 0.98 | 0.73 | 0.74 | 0.71 | 2.78 | 2.38 | 0.15 | −0.04 |
| ROA | −0.642 | −0.620 | −0.527 | −0.511 | −0.462 | −0.468 | −0.786 | −0.740 |
| | −19.97 | −19.01 | −6.57 | −6.28 | −8.71 | −8.76 | −17.51 | −16.16 |
| Advertising | | 0.074 | | 0.231 | | 0.068 | | 0.050 |
| | | 2.49 | | 3.51 | | 1.37 | | 2.12 |
| Advertising × Size | | −0.009 | | −0.029 | | −0.006 | | −0.084 |
| | | −2.39 | | −3.30 | | −0.99 | | −2.89 |
| Number of shareholders | | −0.047 | | 0.033 | | −0.106 | | −0.034 |
| | | −4.04 | | 1.10 | | −5.66 | | −2.11 |
| Institutional ownership | | −0.324 | | −0.315 | | −0.175 | | −0.459 |
| | | −5.29 | | −2.96 | | −1.80 | | −5.21 |
| Number of observation | 12,899 | 12,899 | 3,565 | 3,565 | 4,594 | 4,594 | 4,737 | 4,737 |
| Adjusted $R^2$ | 0.432 | 0.443 | 0.07 | 0.07 | 0.10 | 0.11 | 0.16 | 0.16 |

We also add *Advertising* to the second group since it may affect the overall visibility of the firm.

Table VII presents the results from the cross-sectional regressions of local comovement on firm characteristics. We use as a dependent variable the estimated local betas based on equation (1). We also replicate the same tests using industry-adjusted betas from equation (2) with qualitatively similar results. Since we consider three time periods for the estimation of local betas, we run three separate estimations of the cross-sectional regressions—one for each period. We also run pooled cross-sectional regressions with fixed time effects for all three subperiods in the first two columns of the table (Full Sample).

We observe that the overall explanatory power of the regressions increases over time. The regressions explain more than 15% of the cross-sectional variation in local comovement over the last subperiod. *Size* carries large statistical significance: Local comovement is much stronger for small companies. It is important to emphasize that our local comovement measures are already adjusted for comovement with the overall market. Roll (1988) shows that large stocks covary with the market more than small stocks. We find that, with respect to local comovement, returns of small stocks exhibit much stronger commonality than returns of large stocks.

This “size effect” in local comovement is consistent with the local bias literature, which shows that the local preference of investors is stronger for small-cap firms. For example, Kang and Stulz (1997) find that investors prefer larger and financially healthy firms when investing abroad, presumably to reduce the cost of information asymmetry. Coval and Moswitz (2001) also find that money managers prefer larger firms when investing in remote stocks and smaller firms when investing locally. It is interesting to note that the economic and statistical significance of size drops substantially after the inclusion of the ownership variables. It seems that firm size matters largely to the extent that size affects ownership.

We also find that local comovement is stronger for less profitable firms (smaller *ROA*). This is consistent with the idea that profitable firms are more visible and more likely to attract nonlocal investors. Both *Dividend Yield* and *Market-to-book* do not exhibit significant explanatory power for local comovement. Interestingly, *Leverage* negatively influences local comovement. One potential explanation for the leverage result could be that a firm’s borrowing activity increases its interaction with the capital market and, as a result, its visibility in the investment community.

Share ownership variables are highly significant in explaining the cross-sectional variation in local comovement. Moreover, local comovement is strongly negatively related to the fraction of institutional ownership in the stock (*Institutional Ownership*)—everything else held constant, a 10% increase in institutional ownership results in an expected three-point decline in local betas. We also show that the stock price of firms with a larger number of investors tends to comove less with the prices of other local stocks.

The finding that local comovement of stock returns is positively related to the ownership of individual investors is consistent with the evidence of individual investors’ strong local bias. For example, Brown et al. (2004) find that proximity to publicly traded firms increases an individual investor’s equity market participation and that individuals influence each other in their investment decisions. Hong, Kubik, and Stein (2004) also show that more social individuals tend to participate in the stock market more than less social individuals.

When used separately, *Advertising* is not significantly related to local comovement.[17] This is probably due to the fact that advertising increases both the local and national visibility of the firm. Ideally, we would like to decompose advertising into local and national components, where we would expect that more local advertising would be associated with an increase in local comovement, while more national advertising would be associated with more market-wide comovement. Unfortunately, such information is not available to us.

However, we argue that firm size might be a natural instrument correlated with local (or national) advertising, since small regional firms are much more likely to advertise locally than large firms. After interacting *Advertising* with firm size, we show that more advertising increases significantly the local comovement for small firms and decreases the local comovement for large firms (Table VII). This supports the idea that local comovement of stock returns is affected by familiarity and visibility of the firm in the local community.

### *B. Local Comovement and Regional Characteristics*

In this subsection we extend the cross-sectional regressions from Table VII by including the following four regional characteristics:

- *Numbers of Firms*—the number of firms in an MSA.
- *Industry Concentration*—the Herfindahl index as a measure of industry concentration in the MSA, calculated based on the percentage of firms operating in each industry.
- *Personal Income*——per capita personal income for each MSA derived from the Regional Economic Information System (REIS) provided by the Bureau of Economic Analysis.
- *Investment Income*—per capita investment income for each MSA defined as income derived from dividends, interest, and rent. It is also derived from the REIS provided by the Bureau of Economic Analysis.

*Personal income* is a measure of local economic development. *Investment income*, on the other hand, can be a proxy for the level of financial sophistication of the local residents. The latter could be important in light of recent findings that investor sophistication is significantly related to the tendency to engage in imitative trading behavior. For example, Brown et al. (2004) show that the mutual influence of investors within a region is stronger for less financially sophisticated households and among investors with similar age and income levels. Along the same line, Zhu (2002) argues that the local preference of individual investors does not seem related to any informational advantage of those investors.

[17] This is in contrast to Zhu (2002), who finds that individual investors are more likely to invest in remote companies that spend heavily on advertising.

**Table VIII**

## Cross-sectional Determinant of Local Comovement: Regional and Firm Characteristics

For each stock in the sample, we estimate time-series regressions of monthly stock returns on the returns of a local index and the market portfolio for three 5-year periods: 1988–1992, 1993–1997, and 1998–2002. We then regress the estimated local beta on the following regional and firm characteristics: Number of Firms, the total number of stocks in one MSA; Industry Concentration, the Herfindahl index calculated based on the percentage of firms in one industry for an MSA; Personal Income, the per capita personal income for the MSA; Investment Income, the per capita investment income for the MSA; Size, the natural logarithm of the market capitalization of the firm; Leverage, the total debt over assets ratio; Dividend Yield, the dividend payout divided by the market value of equity; Market-to-book, the market to book ratio; ROA, return on assets; Advertising, the natural logarithm of advertising expenditures; Advertising × Size, the natural logarithm of advertising expenditures interacted with size; Number of Shareholders, the natural logarithm of number of shareholders; and, Institutional Ownership, the fraction of the number of shares held by institutional investors relative to the total number of shares. All independent variables are 5-year annual averages for the three periods. Estimated coefficients and their $t$-statistics are presented in the table. The sample includes domestic common stocks traded on NYSE, AMEX, and NASDAQ from 1988 to 2002 with coverage in Compact Disclosure. We exclude REITs, closed-end funds, and ADRs.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Time fixed effects | Yes | Yes | Yes | Yes | Yes |
| Number of firms | 0.047 | 0.019 | 0.037 | 0.002 | 0.001 |
| | 11.90 | 3.27 | 9.28 | 0.40 | 0.16 |
| Industry concentration | −1.457 | −1.679 | −1.015 | −1.349 | −1.409 |
| | −6.67 | −7.61 | −4.50 | −5.92 | −6.17 |
| Personal income | | 0.035 | | 0.045 | 0.045 |
| | | 7.09 | | 9.10 | 9.08 |
| Investment income | | −0.046 | | −0.073 | −0.074 |
| | | −4.33 | | −6.75 | −6.85 |
| Size | | | −0.133 | −0.138 | −0.100 |
| | | | −26.85 | −27.72 | −11.89 |
| Leverage | | | −0.209 | −0.177 | −0.158 |
| | | | −4.77 | −4.05 | −3.59 |
| Dividend yield | | | 0.001 | 0.001 | 0.001 |
| | | | 0.23 | 0.29 | 0.30 |
| Market-to-book | | | 0.000 | 0.000 | 0.000 |
| | | | 0.83 | 0.71 | 0.50 |
| ROA | | | −0.613 | −0.599 | −0.576 |
| | | | −19.06 | −18.62 | −17.61 |
| Advertising | | | | | 2.84 |
| | | | | | 0.083 |
| Advertising × Size | | | | | −0.011 |
| | | | | | −2.99 |
| Number of shareholders | | | | | −0.034 |
| | | | | | −2.95 |
| Institutional ownership | | | | | −0.329 |
| | | | | | −5.41 |
| Numbers of observations | 14,655 | 14,655 | 12,745 | 12,745 | 12,745 |
| Adjusted $R^2$ | 0.386 | 0.39 | 0.468 | 0.472 | 0.483 |

The literature recognizes two possible links between industry concentration and local economic activity. The first is the classical view of Marshall (1980) that geographic industry concentration facilitates knowledge spillovers among firms. The alternative view is that diversity of firms across industries enhances information exchange (see Davis and Henderson (2004) and Glaeser et al. (1992)). We also include the number of firms in the region (*Numbers of Firms*) as an additional control variable.

In Table VIII, we report various specifications of pooled cross-sectional regressions with fixed time effects. The results for the three subperiods are qualitatively similar, and we omit them here for the sake of brevity. First, we observe that firm-specific characteristics are robust with respect to the inclusion of the regional variables. Next, we find that local comovement is stronger for areas with a larger number of stocks. Interestingly, the significance of the number of firms per region goes away once we control for personal income and other firm characteristics, that is, it seems that the size of the region matters only to the extent that it proxies for personal income. Further, industry concentration is negatively related to local comovement. The latter supports the view of Glaeser et al. (1992) that diversity across industries facilitates the information exchange across firms.

Next, we find that local comovement is positively related to the economic development of the region, as proxied by *Personal Income*. Interestingly, local comovement is negatively related to the level of investor financial sophistication, as measured by *Investment Income*. This is consistent with the finding of Brown et al. (2004) that less financially sophisticated investors are more likely to be influenced in their trading decisions by other investors.

In sum, we find that the local comovement of stock returns is stronger for smaller companies characterized by a larger fraction of local investors. Local comovement is also smaller for firms that are more visible, as measured by the total number of shareholders and advertising expenditures. It is also positively related to the ownership level of individual investors. The geographic proximity of individual investors promotes the transmission of investment sentiment and information through social interaction. These cross-sectional results, along with the lack of an association between comovement of stock returns and comovement of fundamentals, suggest that geographic segmentation contributes strongly to the local comovement of stock returns.

## V. Conclusion

We find a strong degree of comovement in the returns of stocks from the same geographic area. This local comovement is different from the well-documented market-wide and industry-wide comovement in stock returns. We consider two general explanations of the result, namely, fundamentals and geographic segmentation. The first story relates the comovement of stock prices from the same region to the comovement of their fundamentals, while the second relates stock price comovement to correlated trading patterns of local investors.

We do not find support for the fundamental-based view on the local comovement of stock returns, since stocks from the same geographic area do not exhibit any significant local comovement of their underlying earnings processes. Local comovement is also not explained by measures of local economic activity.

Our results are broadly consistent with the geographic-segmentation view on comovement. We find that the local comovement of a stock is stronger for companies that have a larger fraction of local investors, such as small companies (Coval and Moskowitz (1999) and Ivković and Weisbenner (2004)). Local comovement is also stronger for firms with higher local visibility, such as small firms with greater advertising expenditures. Consistent with the evidence of Brown et al. (2004) and Zhu (2002) on the local bias of investors we show that local comovement is positively related to the ownership level of individual investors and inversely related to measures of the financial sophistication of local residents.

Our results have direct implications for asset allocation decisions. For example, the existence of a local component in stock returns implies that geography might be an important consideration in achieving efficient diversification. We note, however, that local comovement seems to be driven largely by the fact that investors are underdiversified geographically. As a result, an increased geographic diversification could result in substantially lower local comovement of stock returns. The local comovement of stock returns also makes the local bias of investors even more difficult to rationalize, given that their labor income has a strong local component. Our results suggest that the social costs of underdiversification, for example in 401(k) pension plan investments (see Benartzi (2001)), might be higher than previously recognized.

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