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The Only Game in Town: Stock-Price Consequences of Local Bias

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Abstract: Theory suggests that, in the presence of local bias, the price of a stock should be decreasing in the ratio of the aggregate book value of firms in its region to the aggregate risk tolerance of investors in its region. We test this proposition using data on U.S. Census regions and states, and find clear-cut support for it. Most of the variation in the ratio of interest comes from differences across regions in aggregate book value per capita. Regions with low population density—e.g., the Deep South—are home to relatively few firms per capita, which leads to higher stock prices via an "only-game-in-town" effect. This effect is especially pronounced for smaller, less visible firms, where the impact of location on stock prices is roughly 15 percent.

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I. Introduction

A number of recent papers document that investors have a tendency to be strongly locally biased in their portfolio choices. This bias shows up not only as a preference for domestic as opposed to foreign stocks (French and Poterba (1991), Cooper and Kaplanis (1994)), but perhaps more strikingly, as a preference for those domestic stocks that are headquartered close by (Coval and Moskowitz (1999), Grinblatt and Keloharju (2001), Huberman (2001)). Both professional money managers and individual investors exhibit some degree of local bias, though it is substantially stronger among individuals (Zhu (2003)).

While the existence of within-country local bias now seems to be incontrovertible, there is little evidence regarding its equilibrium asset-pricing implications.[1] In particular, we know of no work that attempts to relate the *level* of a firm's stock price to market conditions in its home locale.[2] Yet basic theoretical considerations suggest that such a link should exist. The logic is most easily seen by considering an extreme case of local preference in which investors only ever purchase the stocks of companies headquartered in, say, their home state. In this case, each state is its own autarkic capital market, with a risk premium that is determined—loosely speaking—by the ratio of the total supply of shares in the state to the total risk tolerance of investors living in the state.

In what follows, we investigate this hypothesis. We begin by constructing a variable we call RATIO, which for any given region at any point in time, is equal to the aggregate book value

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[1] This is in contrast to the large literature that examines the effects of international market segmentation on asset prices. We discuss this literature in detail in Section V below.

[2] See however, Coval and Moskowitz (2001), and Ivkovic and Weisbenner (2004), who demonstrate that investors—both institutions and individuals—earn excess returns from their investments in local stocks. These findings suggest that local bias is associated with some effect on asset prices.

of all firms headquartered in the region, divided by the aggregate income of all households living in the region.[3] We do this both for individual states, as well as for the nine U.S. Census regions. Next, we run cross-sectional regressions of the log of a firm's market-to-book on RATIO, as well as several controls (including firm return on equity, R&D-to-sales, and industry dummies). Using a sample period that runs from 1970-2001, and a Fama-MacBeth (1973) approach to statistical inference, we find strong evidence that the RATIO variable has a negative impact on stock prices. The results emerge at both the state and the Census-region levels, though they are somewhat stronger in the latter case. If one goes from the Census region with the highest value of RATIO (the Middle Atlantic), to the region with the lowest value (the Deep South), holding all else equal, the implied increase in the stock price is approximately 8.3 percent.

Digging deeper, we find that our results are intimately connected to regional variation in population density. That is, regions with low population density—of which the Deep South is an example—tend to have low values of RATIO, which are associated with higher stock prices. This is because most of the variation in RATIO across regions is driven by the book value component, which is very sensitive to population density. Specifically, if one rewrites RATIO as total book value per capita divided by income per capita, it turns out that both per-capita variables are positively related to population density, but that book value per capita is much more responsive to density than is income per capita. In other words, in spite of low per-capita income, the Deep South is associated with higher stock prices because of an "only-game- in-town" effect: any one company headquartered there faces relatively little competition for local investors' dollars, because so few *other* companies are headquartered there.

[3] Household wealth would arguably be a better proxy for risk tolerance than income, but we have more complete data on income at the regional level.

The role of population density can be thought of in the context of an instrumental-variables (IV) version of our basic specification, in which population density serves as an instrument for RATIO. The idea here is that exogenous geographic and demographic factors shape firms' location decisions, which in turn lead to variation across regions in RATIO, and ultimately, to differences in stock prices. Indeed, when we run such an IV regression, the estimated coefficient on RATIO increases substantially. As we discuss below, this is probably because RATIO is a noisy measure of what we would ideally like to capture. For example, the number of companies literally headquartered in a given region is not the same thing as the number of companies with a significant local presence in the region (e.g., a large manufacturing plant). And to the extent that local bias is related to the latter factor rather than to just the former, OLS will lead us to underestimate the magnitude of the relevant effect.

Of course, using population density as an instrument for RATIO begs the question of whether it is a variable that can legitimately be excluded from the right-hand side of the regression. In other words, are there reasons to think that population density might proxy for some other economic factor that might exert an independent influence on stock prices? One possibility is that regions with low population density have greater future growth prospects, and that it is these superior growth prospects that drive higher stock prices. We attempt to control for this possibility by adding to our baseline regressions a series of future-growth variables, such as future income growth at the regional level, as well as future sales growth and profitability at the firm level. None of these controls materially alter our basic results.

Another way to make further progress on the identification problem is to test some of the theory's subsidiary implications. As we demonstrate with the help of a simple model, the RATIO variable should be expected to have the largest impact on the prices of those firms that are least visible outside of their home regions, and whose shares must therefore be absorbed mostly by local investors. Put another way, even though Microsoft is located in the state of Washington, we might not expect its stock price to be too strongly affected by local-market conditions in Washington, since Microsoft is so well-known to investors everywhere else. Consistent with this hypothesis, we find that the effect of RATIO on stock prices is significantly greater for less visible firms, where we measure visibility with three different proxies: i) firm size; ii) the residual in a regression of the number of investors on firm size; and iii) a dummy for non-zero advertising expenditures. For example, for firms below the sample median size, a move in RATIO from its Middle-Atlantic value to its Deep-South value is associated with a 14.8 percent increase in stock prices. By contrast, the corresponding figure for firms above the sample median size is only 3.9 percent.

The fact that the RATIO variable interacts this way with measures of visibility lends further support to our theory, and helps to cut against the alternative that population density—and by extension, RATIO—is just capturing some other unspecified regional factor that matters for stock prices. More precisely, as long as we are willing to adopt the identifying assumption that this other unspecified factor does not have a *differential* effect across more and less visible firms, the interaction results can be seen as decisive.

The remainder of the paper is organized as follows. In Section II, we develop a simple model that helps to motivate our tests. In Section III, we describe the data we use, and the construction of our principal variables. The empirical results are presented in Section IV. Section V discusses related work, and Section VI concludes.

II. The Model

A. Basic Assumptions

There are N regions of the country. In each region, there are two kinds of firms: "visible" (V) firms and "hometown" (H) firms. In each region, there are also two kinds of investors: "generalists" and "local experts". A generalist can only invest in (i.e., is only aware of) visible firms, though he is not restricted to those in his region—he can invest in visible firms everywhere. A local expert can also invest in visible firms, and in addition, can invest in less-well-known hometown firms, but *only those hometown firms in his own region*.

Denote visible firm *i*, located in region *j*, by F_{ij}^V. Analogously, denote hometown firm *i*, located in region *j*, by F_{ij}^H. Firm F_{ij}^V has a book value of B_{ij}^V, and will pay a liquidating dividend at time 1 of $r_{ij}^V B_{ij}^V$, where r_{ij}^V–which can be loosely thought of as the firm's return on book equity—is a normally distributed random variable with a mean of R_{ij}^V and a variance that for simplicity is normalized to one for all firms. Similar notation applies for the *H* firms.

All investors are assumed to have constant-absolute-risk-aversion (CARA) utility, and the aggregate risk tolerance of investors in region *j* is given by T_j. A fraction θ of this risk tolerance comes from the generalists, and a fraction $(1 - \theta)$ comes from the local experts. The riskless interest rate between time 0 and time 1 is zero.

To simplify the analysis, we further assume that across all firms in all regions, the realizations of the *r*'s are perfectly correlated. This can be thought of as a reduced-form approximation to a one-factor arbitrage-pricing-theory (APT) world, as in Ross (1973), where even within any single region, there are enough hometown firms that a local expert can create a perfectly diversified portfolio that eliminates all idiosyncratic risk.

B. Prices With Only Hometown Firms

To begin, let us consider the simple case where there are only hometown firms—i.e., visible firms do not exist, and hence there is no role for the generalists. We are interested in the pricing of hometown firms in a given region j. Given the perfect-correlation assumption, we can aggregate these firms into a single combined firm. Call the total time-0 market value of this combined hometown firm V_j^H. The expected payoff to this combined firm at time 1 is given by $\sum_i (R_{ij}^H B_{ij}^H)$. Similarly, the variance of the payoff to this combined firm is given by $(\sum_i B_{ij}^H)^2$. Since there is total risk tolerance for hometown firms of $(1-\theta)T_j$ in region j, standard CARA-normal arguments imply that:

$$V_j^H = \sum_i (R_{ij}^H B_{ij}^H) - (\sum_i B_{ij}^H)^2/(1-\theta)T_j \qquad (1)$$

By symmetry, it follows that the market-to-book ratio for any one hometown firm i, denoted by Q_{ij}^H, is given by:[4]

$$Q_{ij}^H = R_{ij}^H - (\sum_i B_{ij}^H)/(1-\theta)T_j \qquad (2)$$

The intuition for equation (2) is straightforward. The greater the aggregate book value of firms in a given region, the more risk local investors have to bear, and consequently, the greater

[4] It is easy to see that the firm-level pricing relationship in (2) aggregates up to the region-level relationship in (1). In other words, we have that $V_j^H = \sum_i (Q_{ij}^H B_{ij}^H)$.

is the discount borne by all firms in that region.[5] Moreover, equation (2) suggests a very direct empirical test. In particular, we have:

Hypothesis 1: Consider a regression of a firm's market-to-book ratio against: i) its ROE; and ii) the ratio of the total dollar book value of firms in its region to some proxy for total regional risk tolerance. We expect the former variable to attract a positive coefficient, and the latter to attract a negative coefficient.

To operationalize a test of this hypothesis, we create an empirical measure, RATIO, that uses total region income as a proxy for regional risk tolerance. We also make a few other minor modifications (e.g., added controls, and a log transformation of the market-to-book ratio). But our baseline regression specification can be thought of as directly motivated by equation (2).

The derivation of equation (2) is made particularly easy by the assumption that all firms in a region have perfectly correlated returns. As noted above, this is a shortcut way to incorporate the CAPM/APT premise that within a region, investors are fully diversified, and hence only care about systematic risk. But we should emphasize that this sort of CAPM/APT approach is not the only way to generate the result. For example, one might go to the other extreme, and assume that all risk is idiosyncratic, and that each local investor only holds a single hometown stock, instead of a well-diversified local portfolio. If it is also the case that the risk tolerance devoted to any one stock in a region is proportional to its book value—i.e., that a

[5] In the spirit of a segmented-market CAPM or APT, it is straightforward to extend the model to a setting where individual stocks in a region have different loadings on the market factor—i.e., different betas. In this case, the price discount for a given stock depends on its own beta, multiplied by a region-level discount factor like that in equation (2). However, since we do not test the beta-related implications of the model, we suppress them for simplicity. In other words, we treat all stocks as if they have betas of one.

bigger company has a greater probability of getting noticed and hence a larger investor base—a pricing formula identical to that in equation (2) once again emerges.

C. Prices With Hometown Firms and Visible Firms

We now turn to the case where there are both hometown and visible firms, and both local-expert and generalist investors. To solve the model in this case, we conjecture the following outcome: i) generalists absorb all the shares of visible firms; and ii) local experts absorb all the shares of their respective hometown firms. With this conjecture in place, it is easy to calculate the prices of the different types of firms. The conjectured outcome will then only be an equilibrium only if, given these prices, local experts *choose* not to invest at all in visible firms because these firms are too expensive; we will have to come back and verify the conditions under which this holds.

If local investors do indeed restrict themselves to holding only hometown firms, the pricing of these hometown firms is exactly as before, and continues to be given by equation (2). Analogously, if visible firms are held only by generalists, we can calculate the market-to-book ratio for any visible firm:

$$Q_{ij}^{V} = R_{ij}^{V} - (\sum_j \sum_i B_{ij}^{V})/(\theta \sum_j T_j) \qquad (3)$$

Intuitively, the difference between equations (2) and (3) is that the generalists pool their risk tolerance together across all the regions, but at the same time they have to absorb the book value of all visible firms across all regions.

In order for this all to be an equilibrium, we require that the risk premium earned by local experts be greater in every region than that earned by generalists. In this way, the local experts will stick to their hometown stocks, and not invest in visible stocks, as conjectured.[6] This requires that:

$$(\sum_i B_{ij}^{H})/(1-\theta)T_j > (\sum_j \sum_i B_{ij}^{V})/(\theta\sum_j T_j) \text{ for all } j. \qquad (4)$$

This condition is most easily satisfied if: i) θ is large, in which case there are a lot of generalists, which pushes down the expected return to visible stocks; or ii) the book value of hometown stocks is high relative to the book value of visible stocks, which pushes up the expected return to hometown stocks.

Assuming that (4) does hold, Hypothesis 1 continues to apply as stated above, although we must now note two caveats. First, if we use observations on all firms in the regression, we will be blurring together the hometown firms—for which the prediction holds—and the visible firms, for which it does not hold. Second, even focusing on observations corresponding to hometown firms, equation (2) tells us that what should go in the numerator of the theoretically ideal ratio variable is the aggregate book value of *hometown* firms in a region, which we cannot measure. So when we use the book value of *all* firms in a region (both visible and hometown) to build our empirical RATIO measure, this constitutes a form of measurement error, which will bias our estimates downwards. This sort of measurement error will be less of a problem to the extent that $\sum_i B_{ij}^{H}$ and $\sum_i B_{ij}^{V}$ are highly correlated at the regional level.

In addition to Hypothesis 1, we now also have:

[6] We also need to assume that local experts cannot short the more expensive visible stocks; otherwise, given our perfect-correlation assumption, it would be a riskless arbitrage for them to do so while buying local stocks.

Hypothesis 2: Consider a regression of a firm's market-to-book ratio against: i) its ROE; and ii) the ratio of the total dollar book value of firms in its region to some proxy for total regional risk tolerance. We expect the negative coefficient on the latter variable to be larger in absolute magnitude for hometown firms than for visible firms.

In the literal context of the model, Hypothesis 2 emerges very starkly, since all visible firms trade in the national market and have exactly the same risk premium. This fact, which is apparent from equation (3), implies that for visible firms, the regression coefficient on the ratio variable should be exactly zero.

The model also makes a third prediction, which is built in by virtue of the assumption that condition (4) holds:

Hypothesis 3: Controlling for ROE, we expect visible firms to have higher values of market-to-book than hometown firms.

The proposition that visibility increases stock prices is essentially a restatement of Merton's (1987) well-known argument. Although this proposition seems eminently reasonable, we do not consider it further in what follows, and instead focus our efforts on Hypotheses 1 and 2. We do so for a couple of reasons. First of all, there is already a large literature on the stock-price implications of visibility.[7] Second, our empirical framework is not well-suited to dealing with the obvious endogeneity problems that accompany any direct attempt to test Hypothesis 3.

[7]Empirical work on this topic includes Kadlec and McConnell (1994), Botosan (1997), Amihud, Mendelson and Uno (1999), Foerster and Karolyi (1999), and Brennan and Tamarowski (2003).

For any measure of visibility that one can think of—and absent a convincing instrument—there is always going to be the question of whether visibility causes higher stock prices, or vice-versa.[8]

III. Data

A. Sources

Our data on personal income and other regional and state demographic variables come from a database produced by the Bureau of Economic Analysis (BEA), the Personal Income and Population Summary Estimates. It is available on the BEA's website, www.bea.doc.gov, going back to 1969. We limit our analysis to the time period from 1970 through 2001.

Our data on firms come from the Center for Research in Security Prices (CRSP) and COMPUSTAT. From CRSP, we obtain stock prices and shares outstanding for NYSE, AMEX and NASDAQ stocks. From COMPUSTAT, we obtain annual information on a variety of accounting variables, as well the locations of firms' headquarters. To be included in our sample, a firm must first have the requisite financial data on CRSP and COMPUSTAT, and must have headquarters in the lower 48 states or in the District of Columbia (i.e., we drop firms located in Alaska and Hawaii). We exclude firms with book equity values of less than 10 million dollars, as well as those with one-digit SIC codes of 6, which are in the financial-services industry.

B. Variable Definitions

The market equity value of a firm (M), defined as the combined value of all common stock classes outstanding, is taken from CRSP as of fiscal year end. For the book equity value

[8] Note that the endogeneity of visibility is less of a problem in the interactive type of specification suggested by Hypothesis 2. Here, we will be on safe ground so long as the reverse-causality effect of stock prices on visibility does not differ across regions in a particular way.

(B), we use COMPUSTAT data item 60. Our primary dependent variable is the log of the ratio of market equity to book equity, i.e., log(M/B). We take logs because the raw market-to-book ratio is highly skewed, and the log transformation results in a variable that is much closer to being symmetrically distributed. However, we obtain similar (albeit somewhat less precisely estimated) results if we instead work with the raw market-to-book ratio. Alternatively, we can use the book-to-market ratio as the dependent variable, which also leads to results very similar to those we report below, though of course with all of the signs reversed. Finally, we have also experimented with an entirely different valuation measure, a firm's cashflow-to-price ratio, C/M, where cashflow C is net income (item 172) plus depreciation (item 14). As we describe in more detail below, this too leads to the same qualitative results.

The BEA database reports total personal income by state and breaks the personal income down by its various parts, including dividend income. Our main independent variable of interest, RATIO, is the ratio of total book equity in a region to total personal income in that region. In calculating personal income, we exclude dividend income, on the notion that keeping it in might induce an artificial, hard-wired relationship between RATIO and stock prices.[9] We calculate RATIO in two ways, by Census region (nine regions in all) and by state. The BEA database also reports per capita income and population density by state, which we can aggregate up to get analogs for Census regions.

A firm's return on book equity (ROE) is its net income (COMPUSTAT data item 172) divided by its previous-year book equity (item 60 lagged one year). R&D expenditures and sales are items 46 and 12, respectively, and we use these to create an R&D-to-sales ratio. The log

[9] If, controlling for ROE, higher dividends are associated with higher stock prices, it is conceivable that a region with a lot of dividend income—and hence a lower value of RATIO, if dividends are included in the calculation of RATIO—would show up as having higher valuations on average.

market-to-book ratio, ROE and R&D-to-sales ratio are all winsorized at the one-percent and 99-percent levels. When the R&D variable is missing, we set its value to zero; however, we also include on the right-hand-side of all our regressions a dummy variable that equals one when a firm does not report R&D.

For the purposes of one of our robustness checks, we create a dummy variable that equals one for a conglomerate, which we define as a firm that operates in more than one business segment. Information regarding firm segments on COMPUSTAT only begins in 1983. So our analysis involving this variable is limited to the sub-sample that runs from 1983 to 2001. If a firm is missing segment data, we assume that it is not a conglomerate, and set the dummy variable to zero.

In another robustness check, we drop observations corresponding to any firms that belong to a dominant industry in its region. For each region (whether it be a Census region or a state) and for each year, we calculate the book value of firms in each two-digit SIC industry, and we deem an industry to be dominant if it accounts for more than 10 percent of the total book value in that region. Note that we only drop these dominant-industry firms from the left-hand-side of our regressions, but keep them in when calculating the total book equity of firms in a Census region or state.

Finally, our interactive specifications make use of data on advertising expenditures (Compustat data item 45), as well as on the number of shareholders (item 100).

C. Anatomy of the RATIO Variable

Table 1 provides some summary statistics for the RATIO variable. In Panel A, we display the value of RATIO for each Census region once every five years between 1970 and

2001, along with both cross-sectional and time-series means and standard deviations. As can be seen, the Middle Atlantic region has consistently had the highest values of RATIO, averaging 0.94 over the sample period. New England runs a close second, with an average RATIO of 0.87. At the other extreme, the Deep South has the lowest average value over the entire sample period, at 0.21, though it has been catching up over time: in 1970, the Deep South was far behind all other regions at 0.07, while by 2000, it had passed the Mountain region, at 0.50 vs. 0.34.

In Panel B, we show the analogous data at the state level. In keeping with the patterns seen in Panel A, states like Connecticut, New York, Michigan and Illinois are among those with the highest values of RATIO, while states like Wyoming, Montana, West Virginia and Vermont rank near the bottom. Even a superficial glance suggests that there seems to be a close link between the RATIO variable and population density.

In order to better understand what is driving the RATIO variable, we take logs and write the log of RATIO as equal to the log of regional book value per capita, minus the log of regional income per capita. Using this decomposition, we can, in any yearly cross-section, ask how much of the variance of the log of RATIO is coming from each of these two terms. The answer is that the lion's share comes from the log of book value per capita: at the Census region level, an average of 74 percent of the total variance of the log of RATIO comes from the log of book value per capita, while at the state level, the corresponding figure is 79 percent.[10]

Table 2 relates this decomposition explicitly to regional differences in population density. We run annual cross-sectional regressions with three different dependent variables: i) the log of RATIO; ii) the log of book value per capita; and iii) the log of income per capita. In each case,

[10] These figures represent the time-series mean values of cross-sectional variance decompositions done on an annual basis.

the sole explanatory variable is regional population density. In Panel A, the regressions are run on Census-region-level data, and in Panel B, they are run on state-level data.

In column 1 of Panel A, it can be seen that the log of RATIO is highly correlated with population density; this confirms the informal impressions from Table 1. The R-squared in the univariate regression averages 0.41, which is equivalent to a correlation coefficient of 0.64. Columns 2 and 3 demonstrate that both components of the log of RATIO are also positively correlated with population density, but that the book value term is considerably more sensitive to population density than the income term, with an average regression coefficient of 0.608 vs. 0.287.[11] In other words, as population density goes up, both book value per capita and income per capita rise too, but the former effect is much stronger than the latter, so that on net, RATIO increases as well. The patterns are qualitatively similar in Panel B, with the state-level data, albeit muted: for example, the R-squared in the regression of the log of RATIO on population density now averages 0.16, corresponding to a correlation coefficient of 0.40.

With a little reflection, the strong effect of population density on book value per capita—and, ultimately, on RATIO—makes intuitive economic sense. There are many good reasons why firms would prefer, all else equal, to locate their headquarters and/or their major operating facilities in densely populated areas: better infrastructure (e.g., large international airports); access to a deeper and higher-quality labor pool; etc. Indeed, these sorts of agglomeration effects provide perhaps the most natural way of thinking about the root source of variation in our RATIO measure.

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[11] Again, these figures represent the time-series means of cross-sectional regression coefficients.

IV. Results

A. Baseline Specification

Table 3 gives a detailed overview of our baseline specification, which is designed to test Hypothesis 1. We take a Fama-MacBeth (1973) approach, running a separate cross-sectional regression each year from 1970 to 2001—a total of 32 regressions in all. In each case, the dependent variable is the log of the market-to-book ratio for a firm. The independent variables are RATIO, firm ROE, firm R&D-to-sales, a dummy for whether the firm reports R&D expenditures, and a set of 2-digit SIC industry dummies. In Panel A, RATIO is measured at the Census-region level, while in Panel B, it is measured at the state level.

The results paint a consistent picture. For example, in Panel A, the coefficient on RATIO takes on the predicted negative sign in 31 of the 32 regressions. Across all of the regressions, the mean value of the coefficient is -0.110, with a Fama-MacBeth standard error of 0.010.[12] Not surprisingly, the coefficients on ROE and R&D-to-sales are both positive in each of the 32 regressions.[13]

To get a sense of magnitudes, recall that the average value of RATIO in the Middle Atlantic is 0.94, while the average value in the Deep South is 0.21. Thus if a firm moves from the Middle Atlantic to the Deep South, holding all else equal, the implied increase in the log of

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[12] Our standard errors account for the serial correlation in the estimated coefficients.

[13] Using a Fama-MacBeth approach to inference is not as well-motivated in the case of the ROE and R&D-to-sales variables. With RATIO, there is an obvious concern about cross-correlated residuals, since there are only nine distinct values of RATIO in a given cross-section; hence our emphasis on the Fama-MacBeth technique. With ROE and R&D-to-sales, it is almost certainly the case that the Fama-MacBeth test statistics vastly understate the confidence one should have in the hypothesis that the true coefficients are in fact positive.

market-to-book is 0.080 (0.110 x (0.94 – 0.21) = 0.080), i.e., the firm's stock price goes up by about 8.3 percent.

In Panel B, everything else is the same, except we now measure RATIO at the state level. In this case, the coefficient on RATIO is negative in 29 of 32 cases; it has a mean value of -0.035 and a Fama-MacBeth standard error of 0.009. If we go from the state with the third-highest average value of RATIO (New York, at 1.28) to the state with the third-lowest average value (Montana, at 0.05), the implied increase in a firm's stock price is now 4.4 percent. Thus while the state-level regressions suggest the same qualitative conclusions as those at the Census-region level, they imply somewhat smaller economic magnitudes. This is consistent with the notion that investors' preference for local stocks may extend somewhat beyond the confines of their home states, so that Census region is a better—though certainly not perfect—approximation to the relevant neighborhood.

B. Alternative Specifications

In Table 4, we experiment with a number of variations on our baseline specification. For compactness, we now display in each row of the table only the time-series average of the cross-sectional regression coefficients, along with the associated Fama-MacBeth standard error. As before, Panel A uses the Census-region version of RATIO, while Panel B uses the state version. We begin our discussion with Panel A.

In Row 1 of Panel A, we reproduce our baseline result—a coefficient on the RATIO variable of -0.110. In Row 2, we add to the regression region per-capita income. This variable is itself completely insignificant, while the coefficient on RATIO is virtually unchanged, at -0.104. Intuitively, this tells us that our results for RATIO are driven almost entirely by variation in the numerator (i.e., book value per capita) and that there is not enough variation in the denominator (per-capita income) to isolate its separate contribution. Such a conclusion is not surprising, given the variance decomposition of RATIO discussed above.

In Row 3, we add to the baseline specification region population density. This variable not only attracts a significant negative coefficient, it also completely drives out RATIO. How should one interpret this result? We can imagine two possible views. On the one hand, it can be argued that there is no a priori theoretical reason for population density to go in these regressions. Thus to the extent that it enters significantly, it must be because it effectively cleans up a measurement error problem in our RATIO variable. Recall that in the numerator of RATIO, we have the book value of firms *headquartered* in a given region. However, it is entirely possible that what matters for local bias is not merely the location of a firm's headquarters, but rather the extent of its operating presence (e.g., major manufacturing plants, large R&D campuses) in a given regional economy. Moreover, it may also be that a region's population density better captures the aggregate presence of publicly listed firms than does the book value of firms that are nominally headquartered there.[14]

The state of Delaware provides a stark illustration of this point. Over the entire sample period, Delaware has the second-highest average value of RATIO among all states, at 1.84. It seems likely that this high value is attributable in part to Delaware's uniquely dominant role in the market for firm incorporations, which might be expected to lead a disproportionate number

[14] As discussed above, there are many reasons why firms would want to locate their major facilities in densely populated areas.

of firms to also list their nominal headquarters as being in Delaware, even if they do not have much of a real operating presence in the state.[15]

Under this measurement-error interpretation, it is neither surprising, nor bad news for our theory, that population density takes out RATIO in an OLS horse race. Indeed, if the measurement-error story is correct, the sensible thing to do would be to use population density as an *instrument* for RATIO, rather than as a competing control variable. We experiment with this approach below.

A more problematic alternative is that population density is a proxy for some other omitted factor that does legitimately belong in the regression. For example, it may be that regions with low population density have the greatest potential for future growth, which would naturally translate into higher expected cashflows for the firms located there. Fortunately, it is possible to address this sort of alternative hypothesis directly, which we do in Row 4-7. In Row 4, we add to the baseline specification a term for future region-level income growth, defined as the rate of growth of total region income over years $t+1$ through $t+3$.[16] This future-growth variable attracts a positive coefficient, as expected, but the impact on RATIO is modest—its coefficient drops in absolute value from -0.110 to -0.093, and it remains strongly significant. In Rows 5 and 6, we add in turn to the baseline regression average future firm ROE, and future firm sales growth, again measured in each case over years $t+1$ through $t+3$. While both of these future firm-level variables have strong positive effects on stock prices, neither appreciably alters the estimated coefficient on RATIO.

[15] See Bebchuk and Cohen (2003), who document that as of 1999, 58 percent of all public firms were incorporated in Delaware.

[16] We have experimented with variations on the timing—e.g., going five or ten years out when measuring future income growth—with little difference to the results.

Finally, in Row 7, we add all three future-growth terms to the regression simultaneously. Once again, RATIO is only modestly changed, at -0.086. Overall, these variations lead us to conclude that population density is probably not proxying for any kind of directly value-relevant factor—at least not one that shows up in future cashflows.

In Row 8, we return to our baseline specification, but drop all observations corresponding to those firms which belong to "dominant" industries in their region. More precisely, we drop any firm whose 2-digit SIC industry accounts for more than 10 percent of the total book value in a region. (We continue to keep these firms for the purposes of calculating the RATIO variable, however.) The idea here is that if there is still some relevant uncontrolled-for factor at the regional level, it is likely to have more of an effect on dominant-industry firms. For example, suppose that—in the spirit of a multifactor APT—there is an extra risk premium on stocks that are heavily exposed to auto-industry risk. It just so happens that Michigan has one of the highest average values of RATIO in the sample, at 1.13. So one might conceivably argue that perhaps Michigan firms have relatively low market-to-book values not because of a RATIO effect, but because of their high loading on auto-industry risk. By eliminating dominant-industry firms, we throw out any auto firms that happen to be located in Michigan, which should tend to mitigate this type of problem.[17] As it turns out, this adjustment has essentially no effect on our results; if anything, the coefficient on RATIO increases a little bit in absolute magnitude.

In Rows 9-11, we experiment with three other controls that might be expected to have some impact on market-to-book ratios: a conglomerate dummy, the log of firm sales, and an

[17] When applied to Michigan, our dominant-industry screen excludes the 2-digit SIC industry described as "transportation manufacturing", which includes automakers.

S&P 500 index dummy. None of these controls makes any appreciable difference to the coefficient on the RATIO variable.[18]

Finally, in Rows 12-13, we run a couple of instrumental-variables (IV) versions of our regressions, using population density as an instrument for RATIO. Again, this approach makes sense to the extent that one believes that: i) there is some measurement error in RATIO relative to what we would ideally like to capture; and ii) population density satisfies the exclusion restriction—i.e., there is no theoretical reason for population density to enter the regression in its own right. Row 12 is the IV analog to Row 1: the only right-hand side variable is RATIO. Row 13 is the IV analog to Row 4: future region income growth is added as another control. This extra control makes it more plausible that population density satisfies the exclusion restriction, because it takes care of the possibility that population density carries information about future regional growth prospects. Consistent with a measurement-error story, both IV regressions generate coefficients on RATIO that substantially exceed those from the OLS specifications. In Row 13, the coefficient on RATIO is -0.188, while in Row 14, it is -0.227.

The patterns in Panel B of Table 4, which uses the state-level measure of RATIO, are generally quite similar to those in Panel A, so we do not discuss them in detail. The one noteworthy exception occurs in Row 3, the OLS horse race between RATIO and population density. In contrast to what we saw in the Census-region data, the coefficient on RATIO now only drops modestly—from -0.035 to -0.026—with the addition of population density, and remains statistically significant. As a purely mechanical matter, population density has less

[18] The coefficient on the S&P dummy is surprisingly large, at 0.343. But note that this does not imply that the causal effect of S&P inclusion on stock prices is over 30 percent. It may just be that a high market capitalization is a criterion for S&P inclusion, above and beyond a high book value.

scope for taking out RATIO at the state level, simply because the correlation between these two variables is not as strong as at the Census-region level (as seen in Table 2).

In addition to the variations reported in Table 4, we have experimented with several other robustness checks. Perhaps most notably, we have redone everything in Tables 3 and 4 with an alternative valuation measure on the left-hand-side of the regressions: the ratio of cashflow to market value. The results run closely parallel to those for the log of market-to-book (though of course all the signs are reversed). In terms of economic magnitudes, the regression coefficients imply that as we move from the Middle Atlantic to the Deep South, a firm's cashflow-to-price ratio falls by 0.0097. Relative to the sample median cashflow-to-price ratio of 0.120, this is an 8.1 percent effect, almost the same as the 8.3 percent effect obtained from the comparable specification for the log of market-to-book.[19]

C. The Interaction of RATIO and Visibility

We now turn to our tests of Hypothesis 2, which suggests that the RATIO variable should have a stronger effect on the prices of less visible firms. To operationalize this hypothesis, we work with three different proxies for low firm visibility. The first is a dummy that equals one when firm size, as measured by sales, is below the sample median value in a given year. The second is a dummy that equals one when the residual number of shareholders—defined as the residual from a regression of the log of the number of shareholders against the log of sales—is below the sample median value in a given year.[20] The third is a dummy that equals one if the

[19] Two details about our cashflow-to-price regressions are worth noting. First, any negative values of the cashflow-to-price ratio are reset to zero. Second, given that the left-hand-side variable now includes a measure of profitability, we drop ROE from the right-hand-side of the regressions.

[20] Grullon, Kanatas and Weston (2004) also use the number of shareholders as a measure of firm visibility, and show that firms with more shareholders have more liquid stocks.

firm does not report positive advertising expenditures. In each case, we begin with our baseline specification, and add two new terms: the low-visibility proxy, and the interaction of the low-visibility proxy and RATIO. Our interest is in the interaction term, which we predict will attract a negative coefficient.

Table 5 presents the results. As before, Panel A uses the Census-region measure of RATIO, and Panel B uses the state measure. In Row 1 of Panel A, with the firm-size proxy for visibility, the coefficient on RATIO is -0.052, and the coefficient on the interaction of RATIO and the low-visibility dummy is -0.137, both strongly statistically significant. These estimates imply that, for a low-visibility (i.e., small) firm, moving from the Middle Atlantic to the Deep South is associated with a 14.8 percent increase in the stock price. In contrast, for a high-visibility (i.e., large) firm, the effect is only 3.9 percent.

In Row 2 of Panel A, with the residual-number-of-shareholders proxy for visibility, the coefficient on RATIO is -0.065, and the coefficient on the interaction of RATIO and the low-visibility dummy is -0.093, again both strongly statistically significant. In this case, the experiment of moving a low-visibility firm from the Middle Atlantic to the Deep South leads to a 12.2 percent stock-price impact, while the number for a high-visibility firm is just 4.9 percent. The strength of the interaction effect is particularly striking here, because the visibility indicator is—by construction—orthogonal to firm size.

In Row 3 of Panel A, we see that the advertising-based proxy for visibility leads to statistically weaker results, although the interaction term still has the predicted negative sign. Similarly, the results in Panel B, which uses the state-level version of RATIO, are also generally weaker. While all the interaction terms continue to be negative, only that in Row 1 of Panel B—where visibility is proxied by firm size—is statistically significant (at the 5.1 percent level).

V. Discussion

A. Implications for Expected Returns and Arbitrage

We have framed our entire empirical analysis in terms of the *level* of stock prices. But as a logical matter, our theory makes a corresponding set of predictions about stock returns. In particular, a stock located in a region with a low value of RATIO should have a high price precisely because it has a low expected return. Moreover, casting the tests in terms of expected returns would seem to have the added advantage of more fully controlling for unobserved heterogeneity in future cashflows. For example, if stocks located in the Deep South have higher prices, there is always the worry that this is in part because there is some missing Deep-South factor (e.g., hidden long-run growth potential) that will ultimately lead to higher cashflows and hence justify the higher prices. If, however, Deep-South stocks have persistently lower returns, such an alternative hypothesis can be dismissed.

So why not look at returns instead of price levels? The answer is that, since all risk premia in our model are permanent in nature, the sorts of price effects that we have documented translate into very small expected-return differentials—far too small to show up as statistically significant, given the power of such tests.[21] To see this concretely, think of a stock with a price-earnings (P/E) ratio of 20. In a simple perpetuity formula, this corresponds to a value of $(k – g)$ of 5 percent, where k is the discount rate and g is the growth rate. Now raise the price of the stock by 15 percent, so that the P/E goes to 23. Relative to our price-level estimates in the previous section, this is a large increase, roughly corresponding to the extremes of the RATIO

[21] It is presumably for this same reason that the literature on index inclusion effects (initiated by Harris and Gurel (1986) and Shleifer (1986)) always looks at prices, rather than expected returns. To the extent that any inclusion effect is both permanent and modest in magnitude, it makes little sense to test the hypothesis that, say, S&P 500 stocks have lower expected returns than non-S&P 500 stocks.

spectrum among the less-visible firms. Yet even with this aggressive calibration, the implied value of *(k – g)* only falls to 4.35 percent. In other words, the expected return only drops by 65 basis points per year.[22]

This same line of reasoning also sheds light on why arbitrage is unlikely to eliminate the price-level effects that we have documented.[23] To exploit the pricing discrepancies across regions, an arbitrageur would have to, e.g., buy the stocks of less-visible Middle-Atlantic firms, and short the stocks of less-visible Deep-South firms. In doing so, he would incur substantial regional risk—the economy of the Deep South could boom unexpectedly relative to that of the Middle Atlantic, thereby devastating his position—all for an annualized alpha (before transactions costs) on the order of 65 basis points. This hardly seems like an attractive trading strategy. Thus in contrast to other, faster-converging phenomena like medium-term momentum (Jegadeesh and Titman (1993)) or post-earnings-announcement drift (Bernard and Thomas (1989, 1990)), here we have a case where there are economically meaningful price-level effects, but little that would be of interest to a money manager.

B. International Asset Pricing with Segmented Markets

There is a clear parallel between our work and the literature on international asset pricing in the presence of segmented markets. One major branch of this literature adopts a CAPM perspective, and asks whether expected returns on stocks in a given small country are driven by their betas with respect to the home-country market portfolio, or their betas with respect to the

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[22] We have in fact tried the expected-return versions of our tests. Not surprisingly, while the point estimates almost always go in the right direction—i.e., higher values of RATIO are generally associated with higher future returns—none of these estimates are close to being statistically significant.

[23] See Petajisto (2004) for a related discussion.

world market portfolio.[24] Typically, the home-country and world equity premia are taken as exogenous in these papers, and little effort is devoted to understanding their determinants. In contrast, we completely ignore beta considerations: in our model, both the local-market and national-market betas of all stocks are effectively set equal to one. Thus our analysis can be thought of as focusing exclusively on the determinants of average local-market equity premia.[25]

It is natural to wonder what implications, if any, our results have for cross-country differences in asset prices. At a general level, they would certainly seem to suggest that local-market supply and demand factors can have meaningful consequences for price levels. At the same time, it would probably be naïve to run cross-country versions of our regressions—with country-wide analogs to the RATIO variable—and expect to get similar results.

One obvious complicating factor has to do with differences across countries in financial development. For example, a country with weak investor protection is likely to have both lower stock prices (LaPorta et al (2002)) as well as fewer publicly-listed firms (LaPorta et al (1997)), and hence a lower value of RATIO. To the extent that it is not possible to control perfectly for the degree of investor protection, this effect will tend to obscure the negative relationship between RATIO and stock prices that we observe in the U.S. data. Said differently, we have seen that within the U.S., cross-region differences in RATIO are driven largely by variation in population density. And we have argued that this sort of variation is plausibly exogenous with respect to the level of stock prices. However, when one looks across countries, other factors

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[24] Notable papers include Stulz (1981), Errunza and Losq (1985), Eun and Janakiramanan (1986), Jorion and Schwartz (1986), Wheatley (1988), Hietala (1989), Bailey and Jagtiani (1994), and Chari and Henry (2004).

[25] In this regard, we are posing a question somewhat analogous to Bekaert and Harvey (2000), and Henry (2000). Both of these papers show that on average, prices go up—and equity premia presumably go down—when an emerging stock market is opened up to foreign investment.

(e.g., investor protection) are likely to play a much bigger role in influencing RATIO, and these other factors may well not be exogenous with respect to stock prices.

VI. Conclusions

The basic message of this paper is a simple one: like many other goods and services, stocks have prices that can be materially influenced by local supply and demand conditions.[26] Just as one would expect the price of a hotel room to be lower in a city where hotel rooms are plentiful, so too is the price of a firm's stock lower if it is located in a region where it must compete for investors' dollars with many other nearby firms. The magnitude of this effect is surprisingly large, especially among smaller, less-visible firms, where the implied price differentials across Census regions are as high as 15 percent.

In closing, we should stress two implications that our analysis *does not* have. First, there is nothing in our results that suggests that any given firm can be made better off—in the sense of generating a higher stock price—by moving to a region with a lower value of RATIO. Recall that every one of our specifications looks at the effect of the RATIO variable *holding fixed firm profitability*, as measured by ROE. And it is obviously unlikely that a typical firm located in a high-RATIO state like New York could move to a low-RATIO state like West Virginia without adversely affecting its profitability.

Second, in spite of the relatively large stock-price effects that we document, there is little here of interest to would-be arbitrageurs. Given that location exerts a permanent influence on expected returns, it takes only a small rate-of-return wedge to generate the sorts of price-level differentials that we see in the data. Thus any arbitrage strategy based on our findings is likely to

[26] This conclusion is very much in the spirit of Summers (1985).

have a very small alpha relative to the associated risks and transactions costs. Indeed, it is for precisely this reason that even our most aggressive price-level estimates can be defended as economically plausible, since they do not suggest any easily exploitable arbitrage opportunities.

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Table 1: Summary Statistics for RATIO, 1970-2001

The entries are values of RATIO, the ratio of total book equity to total personal income (less dividends) in a given region. Panel A reports RATIO for the nine Census regions in every fifth year, starting in 1970, as well as the time-series means and standard deviations (using all the years, 1970-2001). In addition, for each of the years shown, the cross-sectional mean and standard deviation of RATIO are also reported. Panel B is similar to Panel A except that RATIO is reported at the state level for 48 states and for the District of Columbia (Alaska and Hawaii are excluded).

Panel A: Summary Statistics by Census Region

	1970	1975	1980	1985	1990	1995	2000	Mean	S.D.
New England	0.75	0.94	0.97	0.81	0.76	0.84	0.91	0.87	0.08
Middle Atlantic	0.87	1.03	1.05	0.87	0.77	0.84	1.16	0.94	0.13
Midwest	0.75	0.81	0.77	0.84	0.76	0.75	0.66	0.76	0.06
Plains	0.25	0.34	0.38	0.38	0.36	0.50	0.69	0.42	0.12
Atlantic Coast	0.35	0.43	0.37	0.38	0.36	0.43	0.54	0.41	0.05
Deep South	0.07	0.15	0.15	0.17	0.14	0.29	0.50	0.21	0.13
Southern Plains	0.66	0.76	0.72	0.64	0.57	0.63	0.87	0.69	0.09
Mountain	0.27	0.31	0.25	0.36	0.32	0.33	0.34	0.31	0.04
West Coast	0.33	0.41	0.40	0.39	0.37	0.48	0.78	0.44	0.10
X-sectional Mean	0.48	0.58	0.56	0.54	0.49	0.57	0.72		
X-sectional S.D.	0.28	0.31	0.32	0.26	0.23	0.21	0.25		

Panel B: Summary Statistics by State

	1970	1975	1980	1985	1990	1995	2000	Mean	S.D.
New England									
Connecticut	1.92	2.31	2.45	1.89	1.76	1.73	1.67	2.00	.26
Massachusetts	0.27	0.42	0.38	0.43	0.39	0.56	0.75	.46	.11
Maine	0.04	0.04	0.04	0.05	0.06	0.09	0.13	.07	.03
New Hampshire	0.12	0.19	0.22	0.17	0.09	0.22	0.11	.16	.04
Rhode Island	0.44	0.56	0.62	0.52	0.60	0.69	0.72	.61	.08
Vermont	-	0.02	0.02	0.02	0.04	0.10	0.11	.06	.05
Middle Atlantic									
New Jersey	0.49	0.61	0.57	0.57	0.50	0.57	0.73	.58	.07
New York	1.14	1.36	1.46	1.17	1.05	1.16	1.71	1.28	.21
Pennsylvania	0.65	0.77	0.75	0.57	0.50	0.52	0.54	.61	.12
Midwest									
Illinois	0.86	0.99	1.01	1.09	0.98	1.01	0.93	.99	.06
Indiana	0.09	0.18	0.19	0.17	0.18	0.24	0.29	.20	.05
Michigan	1.41	1.34	1.08	1.28	1.28	1.01	0.61	1.13	.27
Ohio	0.52	0.61	0.67	0.68	0.48	0.59	0.69	.60	.09
Wisconsin	0.22	0.34	0.32	0.29	0.28	0.36	0.36	.31	.04
Plains									
Iowa	0.05	0.10	0.11	0.15	0.16	0.22	0.16	.15	.05
Kansas	0.05	0.10	0.09	0.09	0.07	0.11	0.15	.10	.03
Minnesota	0.40	0.55	0.59	0.55	0.46	0.60	0.68	.55	.07
Missouri	0.35	0.50	0.54	0.53	0.49	0.61	0.77	.55	.11
North Dakota	-	-	0.00	0.03	0.00	0.02	0.10	.03	.04
Nebraska	-	0.29	0.31	0.44	0.61	1.16	2.44	.78	.72
South Dakota	-	0.04	0.08	0.03	0.02	0.15	0.17	.06	.05
Atlantic Coast									
Delaware	1.78	2.32	1.80	2.00	1.81	1.14	1.42	1.84	.38
District of Columbia	0.19	0.51	0.65	0.68	0.91	2.05	2.14	1.05	.70
Florida	0.20	0.26	0.21	0.16	0.13	0.21	0.26	.21	.05
Georgia	0.27	0.38	0.36	0.52	0.54	0.59	0.79	.50	.15
Maryland	0.26	0.30	0.28	0.27	0.23	0.27	0.31	.27	.02
North Carolina	0.27	0.37	0.33	0.30	0.27	0.51	0.89	.42	.20
South Carolina	0.08	0.13	0.11	0.11	0.13	0.15	0.17	.13	.03
Virginia	0.74	0.76	0.69	0.68	0.59	0.61	0.52	.66	.09
West Virginia	-	0.02	0.00	0.01	0.06	0.07	0.05	.03	.03
Deep South									
Alabama	0.04	0.11	0.13	0.18	0.19	0.28	0.40	.19	.11
Kentucky	0.10	0.18	0.17	0.16	0.15	0.22	0.16	.17	.03
Mississippi	-	0.04	0.03	0.05	0.06	0.18	1.35	.27	.45
Tennessee	0.07	0.19	0.19	0.20	0.13	0.36	0.41	.23	.11
Southern Plains									
Arkansas	0.05	0.09	0.13	0.24	0.45	0.80	1.14	.41	.36
Louisiana	0.12	0.16	0.16	0.21	0.19	0.26	0.29	.20	.05
Oklahoma	0.53	0.57	0.57	0.27	0.22	0.30	0.51	.42	.14
Texas	0.89	1.02	0.95	0.83	0.71	0.72	0.98	.88	.12
Mountain									
Arizona	0.39	0.43	0.32	0.30	0.21	0.21	0.22	.29	.08
Colorado	0.31	0.43	0.32	0.62	0.62	0.50	0.54	.47	.11
Idaho	0.43	0.39	0.39	0.42	0.40	0.38	0.62	.41	.07
Montana	-	0.00	0.04	0.06	0.00	0.12	0.13	.05	.05
New Mexico	-	0.02	0.04	0.02	0.05	0.11	0.12	.07	.05
Nevada	0.06	0.11	0.11	0.19	0.16	0.37	0.33	.19	.10
Utah	0.21	0.27	0.24	0.26	0.21	0.32	0.19	.25	.04
Wyoming	-	-	0.01	0.02	0.01	0.01	0.01	.01	.01
West Coast									
California	0.37	0.43	0.43	0.40	0.38	0.50	0.78	.46	.10
Oregon	0.07	0.22	0.26	0.27	0.33	0.39	0.28	.27	.08
Washington	0.19	0.34	0.33	0.32	0.33	0.39	1.01	.38	.17
Cross-sectional Mean	0.42	0.46	0.42	0.42	0.40	0.48	0.61		
Cross-sectional S.D.	0.46	0.51	0.48	0.44	0.41	0.42	0.55		

Table 2: RATIO and its Components vs. Population Density, 1970-2001

Each entry is the time-series mean of cross-sectional regression coefficients, estimated each year from 1970-2001. The dependent variables include: i) the log of RATIO, the ratio of total book equity to total personal income (less dividends) in a given region.; ii) the log of total book equity per capita in a region; and iii) the log of per capita income in a region. Each of these variables is regressed one at a time against population density in a region. In Panel A, all variables are measured at the Census-region level, and in Panel B, all variables are measured at the state level.

Panel A: Results by Census Region

Dependent Variable	Log(RATIO)	Log(Region Book/Capita)	Log(Region Income/Capita)
Coefficient $\times$ 100	.317 (.067)	.608 (.012)	.287 (.039)
R-squared	0.41	0.48	0.31

Panel B: Results by State

Dependent Variable	Log(RATIO)	Log(State Book/Capita)	Log(State Income/Capita)
Coefficient $\times$ 100	.208 (.025)	.333 (.041)	.122 (.023)
R-squared	0.16	0.16	0.09

Table 3: RATIO and Stock Prices, Detailed Fama-MacBeth Results

The dependent variable is the log of the ratio of market equity to book equity for a company. The independent variables are RATIO, the ratio of total book equity to total personal income of the region in which the company is located, along with the company's ratio of R&D to sales, and return on equity (ROE). Also included in the regressions (but not shown) are a dummy variable which equals one if the company does not report R&D expenditures, and a set of 2-digit SIC industry dummies. Panel A reports the results for Census regions, and Panel B reports the results for states. Entries are the coefficients for RATIO, R&D to sales, and ROE, and the R-squared of the cross-sectional regressions by year. Also reported are the time-series means of these coefficients, the Fama-MacBeth (serial-correlation-adjusted) standard errors, and the fraction of the years in which the regression coefficients have the predicted signs.

Panel A: Results by Census Region

	RATIO	R&D to Sales	ROE	R-squared
1970	-.067	8.45	3.13	0.44
1971	-.156	9.61	2.77	0.39
1972	-.092	9.78	3.85	0.45
1973	-.161	11.9	3.22	0.37
1974	-.139	9.36	1.80	0.29
1975	-.077	9.35	2.61	0.39
1976	-.091	7.91	2.42	0.37
1977	-.042	5.40	2.22	0.40
1978	-.086	5.17	2.36	0.44
1979	-.046	7.77	1.82	0.43
1980	-.091	5.91	2.10	0.47
1981	-.193	6.97	1.73	0.39
1982	-.092	3.85	1.33	0.31
1983	-.140	1.79	1.19	0.34
1984	-.115	1.45	1.13	0.29
1985	-.085	.742	.921	0.27
1986	-.043	.868	1.09	0.27
1987	-.156	.659	.891	0.22
1988	-.144	.298	.963	0.20
1989	-.130	.341	.990	0.23
1990	-.242	.810	1.26	0.26
1991	-.153	.975	1.36	0.28
1992	-.147	.675	.953	0.21
1993	.023	.424	.706	0.16
1994	-.103	.470	.811	0.19
1995	-.141	.667	.694	0.22
1996	-.166	.709	.639	0.22

1997	-.090	.498	.626	0.18
1998	-.085	.475	.709	0.19
1999	-.150	.761	.615	0.24
2000	-.047	.680	.830	0.24
2001	-.079	.290	.672	0.19
Mean	-.110	4.06	1.70	
F-M standard error	.010	3.40	1.04	
# with correct sign	31/32	32/32	32/32	

Panel B: Results by State

	RATIO	R&D to Sales	ROE	R-squared
1970	-.012	8.48	3.13	0.44
1971	-.055	9.60	2.77	0.39
1972	-.050	9.73	3.86	0.45
1973	-.054	11.8	3.22	0.37
1974	-.043	9.35	1.82	0.28
1975	-.014	9.35	2.61	0.39
1976	-.016	7.91	2.42	0.37
1977	-.009	5.42	2.23	0.39
1978	-.038	5.18	2.36	0.44
1979	-.030	7.75	1.83	0.43
1980	-.032	5.89	2.11	0.48
1981	-.089	6.95	1.74	0.38
1982	-.035	3.85	1.33	0.31
1983	-.076	1.80	1.19	0.34
1984	-.044	1.46	1.13	0.29
1985	-.058	.734	.918	0.27
1986	-.040	.861	1.09	0.27
1987	-.048	.664	.892	0.21
1988	-.046	.300	.965	0.20
1989	-.025	.349	.993	0.23
1990	-.104	.818	1.27	0.25
1991	-.092	.973	1.36	0.28
1992	-.099	.670	.952	0.21
1993	.021	.425	.706	0.16
1994	-.041	.470	.811	0.19
1995	-.032	.670	.693	0.22
1996	-.028	.711	.639	0.22
1997	.008	.502	.625	0.18
1998	.015	.477	.705	0.19
1999	-.005	.763	.612	0.24
2000	.030	.681	.831	0.24
2001	-.027	.290	.670	0.19
Mean	-.035	4.07	1.71	
F-M standard error	.009	3.43	1.04	
# with correct sign	29/32	32/32	32/32	

Table 4: RATIO and Stock Prices, Alternative Specifications

This table presents the results of variations on the Fama-MacBeth regressions in Table 3. The dependent variable is the log of the ratio of market equity to book equity for a company. In addition to the independent variables in Table 2, Row 2 adds region per capita income. Row 3 adds region population density. Row 4 adds the growth rate of region income from year *t+1* to *t+3*. Row 5 adds the average firm ROE over years *t+1* through *t+3*. Row 6 adds the growth rate of firm sales from year *t+1* to *t+3*. Row 7 adds all the future controls in Rows 4-6 simultaneously. Row 8 removes observations corresponding to industries that account for more than ten percent of total book value in a region. Row 9 adds a dummy for whether a firm is a conglomerate. Row 10 adds the log of firm sales. Row 11 adds a dummy for S&P 500 index membership. Row 12 instruments for RATIO with population density. Row 13 instruments for RATIO with population density, and also controls for the growth rate of region income from year *t+1* to *t+3*. Panel A reports the results for Census regions, and Panel B for states. Entries are the time-series means of the regression coefficients, and the Fama-MacBeth (serial-correlation-adjusted) standard errors. Statistical significance at the ten, five and one-percent levels indicated by *, **, and ***, respectively.

Panel A: Results by Census Region

	RATIO	Future Region Inc. Growth	Future Firm ROE	Future Firm Sales Growth	Misc.
1. Baseline Specification	-.110*** (.010)				
2. Add Region Per Capita Income	-.104*** (.023)				-.269 (.410)
3. Add Region Population Density	-.001 (.033)				-.265*** (.083)
4. Add Future Region Income Growth	-.093*** (.015)	.211 (.152)			
5. Add Future Firm ROE	-.105*** (.011)		1.34*** (.239)		
6. Add Future Firm Sales Growth	-.100*** (.014)			.131*** (.012)	
7. Add All Future Controls	-.086*** (.015)	.176 (.160)	1.33*** (.235)	.035*** (.010)	
8. Remove Dominant Industries	-.116*** (.012)				
9. Add Conglomerate Dummy	-.113*** (.013)				-.032 (.055)
10. Add Log Sales	-.120*** (.011)				.056 (.036)
11. Add S&P 500 Indicator	-.105*** (.010)				.343*** (.098)
12. IV with Pop. Density Instrument	-.188*** (.042)				
13. IV with Pop. Density Instrument and Future Region Income Growth	-.227*** (.063)	-.201 (.216)			

Panel B: Results by State

	RATIO	Future State Inc. Growth	Future Firm ROE	Future Firm Sales Growth	Misc.
1. Baseline Specification	-.035*** (.009)				
2. Add State Per Capita Income	-.039*** (.006)				-.075 (.225)
3. Add State Population Density	-.026*** (.009)				-.067*** (.014)
4. Add Future State Income Growth	-.029*** (.010)	.554*** (.075)			
5. Add Future Firm ROE	-.035*** (.011)		1.35*** (.241)		
6. Add Future Firm Sales Growth	-.032*** (.011)			.133*** (.012)	
7. Add All Future Controls	-.028*** (.010)	.476*** (.119)	1.32*** (.232)	.035*** (.011)	
8. Remove Dominant Industries	-.032** (.013)				
9. Add Conglomerate Dummy	-.037*** (.014)				-.032 (.055)
10. Add Log Sales	-.045*** (.009)				.056 (.036)
11. Add S&P 500 Indicator	-.037*** (.008)				.344*** (.098)
12. IV with Pop. Density Instrument	-.183*** (.050)				
13. IV with Pop. Density Instrument and Future State Income Growth	-.072 (.378)	.431 (.376)			

Table 5: Interaction of RATIO and Firm Visibility

This table presents the results of variations on the Fama-MacBeth regressions in Table 3. The dependent variable is the log of the ratio of market equity to book equity for a company. In addition to the independent variables in Table 2, each row adds a low-visibility indicator (not shown) and the interaction of RATIO and the low-visibility indicator. In Row 1, the low-visibility indicator is a dummy that equals one if the firm's sales are below the median value in a given year. In Row 2, the indicator is a dummy that equals one if, in a given year, the firm has a below-median residual in a regression of the log of the number of shareholders on the log of firm sales. In Row 3, the indicator is a dummy that equals one if the firm does not report positive advertising expenditures in a given year. Panel A reports the results for Census regions, and Panel B reports the results for states. Entries are the time-series means of the regression coefficients, and the Fama-MacBeth (serial-correlation-adjusted) standard errors. Statistical significance at the ten, five and one-percent levels indicated by *, **, and ***, respectively.

Panel A: Results by Census Region

	RATIO	RATIO × Low Visibility Indicator
1. Firm Size	$-.052^{***}$	$-.137^{***}$
	(.015)	(.047)
2. Residual Number of Shareholders	$-.065^{***}$	$-.093^{***}$
	(.022)	(.035)
3. Advertising	$-.083^{***}$	-.035
	(.025)	(.027)

Panel B: Results by State

	RATIO	RATIO × Low Visibility Indicator
1. Firm Size	-.022	$-.045^{*}$
	(.015)	(.023)
2. Residual Number of Shareholders	$-.030^{**}$	-.013
	(.015)	(.014)
3. Advertising	-.012	-.026
	(.039)	(.037)