# Another look at Breadth of Ownership and Stock Returns

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This paper revisits the results of Chen et al. (2002), which shows that the *breadth* of ownership, implemented as the number of mutual fund owners of a firm, is important for the crossection of asset returns. Their results are justified as implications of the classical model of short sales constraints by Miller (1977). Our Norwegian setting allows us to revisit this result using a better suited data set, since our database on the ownership of Norwegian equities covers monthly observations of the complete ownership structure over the period 1989 to 2003, a period of 14 years. Our data set also allows us to investigate alternative breadth measures, not just restricted to the mutual fund holdings used by Chen et al., such as total number of owners and ownership concentration. Our results show that the Chen et al. results are really about mutual funds trading. Quarterly mutual funds trades predict next quarters returns. However, broader breadth measures, such as the change in individual (private) owners, have opposite effects. We show evidence that the channel through which the effects happen is by the mutual funds selling to (new) individual investors, and not by an increase in ownership concentration. We find that the quarterly effect is not observed on a monthly horizon. We hypothesize that this may be due to short term effects from the mutual fund's actual trading, since we observe a strong contemporaneous link between asset returns and mutual fund trading.

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# Another look at Breadth of Ownership and Stock Returns

**Abstract**

This paper revisits the results of Chen et al. (2002), which shows that the *breadth* of ownership, implemented as the number of mutual fund owners of a firm, is important for the crossection of asset returns. Their results are justified as implications of the classical model of short sales constraints by Miller (1977). Our Norwegian setting allows us to revisit this result using a better suited data set, since our database on the ownership of Norwegian equities covers monthly observations of the complete ownership structure over the period 1989 to 2003, a period of 14 years. Our data set also allows us to investigate alternative breadth measures, not just restricted to the mutual fund holdings used by Chen et al., such as total number of owners and ownership concentration. Our results show that the Chen et al. results are really about mutual funds trading. Quarterly mutual funds trades predict next quarters returns. However, broader breadth measures, such as the change in individual (private) owners, have opposite effects. We show evidence that the channel through which the effects happen is by the mutual funds selling to (new) individual investors, and not by an increase in ownership concentration. We find that the quarterly effect is not observed on a monthly horizon. We hypothesize that this may be due to short term effects from the mutual fund's actual trading, since we observe a strong contemporaneous link between asset returns and mutual fund trading.

A lot of recent research focus has been on the implications of models with heterogenous expectations and short sale constraints on the crossection of stock returns. The model of Miller (1977) gives the basic intuition. With heterogenous expectations, a stock price is an aggregation of the expectations of its various investors, as reflected in stock prices. Under standard assumptions this aggregation will lead to the stock price being an unbiased predictor of the current value. If one now adds constraints on selling stocks short, the pessimists (investors with negative information) who would, if they could trade, short the stock, is precluded from doing so. Miller's story is that this will lead to prices only reflecting optimists (traders with positive or neutral information), the negative information of the pessimists will not be reflected in prices. Millers hypothesis has the implication that stocks with binding short sales constraints will be overpriced. Taking this to the crossection of stock returns, Miller's hypothesis implies that stocks with more pessimists will have lower subsequent returns.

The Miller intuition has two necessary components, heterogenous expectations and short sale constraints. While some empirical studies have looked at differences in opinion,[1] the majority of empirical studies looks directly at the short sales constraint. Early work focused on short interest, either in the stock market or in the options market.[2] In recent years, this work has been extended by using data on actual holdings on investors. The best known example of this style of work is Chen et al. (2002), which introduce the concept of *breadth* of ownership. Breadth is related to the number of owners in a firm, and a reduction in the number of owners, which Chen et al. terms a *reduction of breadth*, is found to predict subsequent negative returns. The argument which links this result to the Miller intuition is the following: Consider owners who

[1] See for example Verardo (2002) and Diether et al. (2002).

[2] See e.g. Figlewski (1981), Asquith and Meulbroek (1995), Lamont and Stein (2003) and Asquith et al. (2005) for studies of the short interest in the stock market, and e.g. Figlewski and Webb (1993) and Danielsen and Sorescu (2001) for data from options.

can not take a short position. When owners have information suggesting they should short, but cannot, they will at least reduce their holdings to zero. A decrease in the number of owners is evidence of more potential short interest, and will predict a lower subsequent return. Since Chen et al. do not have complete ownership data, they look at quarterly data on mutual fund ownership instead of a more complete measure of breadth of ownership, and find that a decrease in the number of mutual funds long in a stock predicts lower returns for the next quarter, which they interpret as support for the Miller hypothesis. Their results are however open to alternative interpretations, such as mutual funds being better informed and getting out before the penny drops for the rest.

The purpose of the present paper is to revisit these breadth results with a better suited data set. We use data for the Oslo Stock Exchange, where we have monthly observations of the complete ownership structure of every firm on the exchange over a 14 year period. This allows us to construct breadth measures closer to what Chen et al. had in mind in their theoretical model. Our Norwegian results complement their findings. While we do find the same result as them on quarterly horizons, we show that their findings is limited to the mutual fund sector. Our results show that changes in mutual fund ownership predict the next quarters returns in the same manner as in Chen et al. (2002), stocks where the number of mutual fund owners decreases have a lower return the subsequent quarter. However, when we compute broader measures of breadth, we find that the effect is reversed. In particular, looking at the number of individual (private, noncorporate) owners we find that an increase in the number of such owners predicts a lower return the next quarter. The results thus indicate that the mutual fund sector is better at identifying bad news, and sell their stakes to individual investors. To look more closely at these effects we consider monthly returns. We first see whether changes in breadth over a month can predict the next months return. Here we surprisingly find that the results we find over the quarterly horizon are not there over a monthly horizon, in fact, for the period where short sales were not legal, decreases in mutual funds owners predict higher stock returns the next month. To resolve this puzzling result we considered contemporaneous returns, returns calculated over the same month as the ownership changes. Here we find similar results to the quarterly case, equities where the number of mutual fund owners decrease have significantly lower returns than equities with increases in mutual fund owners.

While the contemporaneous case should be interpreted with caution, since we can not adress causation in the case of simultanous movements, we hypothese that the following can explain the results: The mutual fund sector shows superior ability to identify longer term equity information, information which is revealed over quarterly horizons. The funds trade on this information by selling out stocks they are pessimistic about and buying the stocks where they are optimistic. However, the actual trading by the funds affects prices, which explain that returns over the same month follow the direction of trading by mutual funds: Stocks where mutual funds are selling have a lower return, due to the selling by mutual funds depressing prices. This immediate reaction, which is a microstructure effect, and fits with the Diamond and Verrecchia (1987) model, also explain that we don't find any effects over the next month. The immediate effect

happens as trading happens, and the long term information is not revealed over the next month, but revealed over the longer term, quarterly, horizon.

The paper proceeds as follows: We first, in section 1, go over the literature and place the work of this paper into its context. Section 2 then give some information about the data and potential breadth measures. Section 3 details the empirical methods we use. In doing the analysis we first, in section 4 look at determinants of breadth measures before section 5 considers the link between breadth and asset returns. Section 6 offers a conclusion.

# 1 Review of existing literature

The Miller (1977) intuition has two components, heterogenous expectations and short sales constraints. The history of the theoretical modeling following Millers paper is surveyed in Rubinstein (2004). The most important insight from the later theoretical literature, typified by Diamond and Verrecchia (1987), is that the implications of the Miller insight should really be viewed as a difference in the speed at which information is incorporated into prices through trading. Good news is incorporated into prices *faster* than bad news. In both cases information is *eventually* revealed, but the horizon differs. Bad news is not revealed as fast because those who have that information can not act upon it due to the short sales constraint. Stating the implication of the Miller intuition this way emphasizes the link to the literature on market microstructure, which has exactly that focus: How is information incorporated into prices? It is somewhat puzzling is that little of the empirical literature concerned with the implications of the Miller model has acknowledged this link. Doing so would have lead to more focus on the question on what is the *relevant horizon* to use in empirical work on this model. The issue is really the nature of the information that could potentially be revealed by short selling, and other channels through which this information could be revealed. A typical market microstructure model would have the implication that information is gradually revealed through trading.

The relevant empirical literature can be grouped after which of the two basic components, heterogenous expectations, and short sales constraints, it focuses on. A small number of papers looks directly at the divergence of opinions among traders, and links this to asset returns. Verardo (2002) looks at dispersion in analysts forecast and link them to returns momentum. Diether et al. (2002) uses dispersion of analysts forecasts as a proxy for differences of opinion, and find results consistent with the Miller intuition. However, Johnson (2004) argues that these results are not necessarily linked to the Miller intuition. He shows that similar crossectional implications can be found in a fully rational setting, where the analyst forecasting ability instead reflects idiosyncratic parameter risk, which is reflected in asset returns by the standard result that when equity is viewed as an option on assets, its value is increasing in volatility. The empirical implication is that this effect is increasing in leverage, which Johnson shows is the case. This leverage effect is not related to the Miller intuition.

The major part of the relevant empirical literature is concerned with data on actual market trading. Asquith et al. (2005) groups this literature into three. The oldest strand of the literature looks directly at the amount of short selling, and uses this to predict future returns. The typical

measure of short selling is short interest in the stock itself. Work on the short interest include Figlewski (1981), Asquith and Meulbroek (1995), Ofek and Richardson (2003), Lamont and Stein (2003), Lamont (2004) and Asquith et al. (2005). Since an alternative way of going short in a stock is to buy put options on the stock, a number of papers, such as Figlewski and Webb (1993) and Danielsen and Sorescu (2001), use data from the options markets.

An alternative way of looking at short selling is to use the prices at which one can go short, the rebate rate. D'Avilio (2002), Jones and Lamont (2002) and Ofek et al. (2003) all focuses on the market for borrowing stock.

The latest strand of the literature focuses on institutional ownership, or more generally, the *breadth* of ownership. The idea is that many owners, and in particular financial institutions, have restrictions on going short. For such owners, even when they have information making them want to go short, they cannot. All they can do is to reduce their holdings to zero. Observing that many owners are leaving a stock is what Chen et al. terms a reduction in the *breadth* of ownership. This notion of breadth is what we are concerned with in the present paper. The empirical proxy for breadth of ownership used in Chen et al. is the number of mutual funds with a long position in a stock, which are observed quarterly due to reporting requirements. The quarterly changes in the number of mutual funds long in a stock is found to predict next quarters returns. The open question with these results is whether the mutual fund ownership is the correct proxy for the theoretical concept of breadth. Both Chen et al. and Asquith et al. (2005), who combine the institutional ownership and short interest approaches, argue that mutual funds is the best proxy, but one wonders how much of this argument is due to the fact that data on mutual funds is what they have.

The problem is that there is no explicit modelling of what mutual funds represent. Are they used becuase they are representative owners, for whom one knows they are short sales constrained? Or is the mutual fund sector *more likely to be informed*? The first is the breadth theory Chen et al. have in mind. The second is more of an informed trader explanation. Using the data of Chen et al. it is hard to distinguish these two explanations. To see how we will attack this issue think about the *other* owners of a firm. Since the total number of stocks is constant, by what mechanism are mutual funds decreasing their stake? This can happen by either the other current owners of that stock increasing their stake, or by *new* owners buying the stock. One of the contributions of the present paper is that we are able to distinguish these two cases. The first case, where existing owners are *increasing their stake*, is identified using *increased ownership concentration*. We argue that the theoretical breadth relation is more likely when other short sellers are not entering, existing shareholders have to take up the slack, and concentration increases. The differential information explanation is more likely to be the case when concentration is unchanged in cases where mutual funds sell out. This means that the mutual funds are selling to *other* buyers than the present owners. Through our calculations of breadth and concentration measures for all owners as well as for different groups of owners we can disentangle these two issues. We will show that the bulk of the evidence is for the differently informed explanation, not the theoretial breadth relation.

A good deal of the recent literature links the Miller (1977) effects to well known asset pricing issues, particularly the firm size, book/market and momentum effects in asset returns. Chen et al. (2002), Nagel (2003), Verardo (2002) all emphasize such links.

The research discussed above concentrates on the US market, but there has also been some work on these issues in international markets. Two recent papers, Bris et al. (2004) and Charoenrook and Daouk (2004), take a broad view, and look at crossectional differences across markets, collecting data for respectively 46 and 111 countries. They investigate differences in efficiency across markets linked to feasibility of short selling. Both papers claim that efficiency is higher in markets with fewer impediments to short selling. In the course of their analysis both papers looks at events where countries change their short sales regulation, from it being disallowed to being allowed.[3]

A number of papers have used data from single non-US markets to look at some specific issues related to short sales. In Australia short sales have to be made public immediately. Aitken et al. (1998) looks at microstructure data from the Australian market and show that increases in short interest is almost immediately bad news, the market reacts negatively within 15 minutes. In Hong Kong short sales are only allowed for selected stocks, and the list of stocks for which it is allowed change over time. Chang and Yu (2004) uses data for stocks that go in and out of these lists to investigate the effects of short sales.

# 2 Data and breadth measures

## 2.1 Data

This paper uses data from the Norwegian equity market for the period 1989 to 2003. We use two types of data. One is data on corporate ownership from the Norwegian Securities Registry (VPS). From this source we have annual (1989-1992) and monthly (1993-2003) data. At each date, we observe the number of stocks owned by every owner. Each owner has a unique identifier which allows us to follow the owners' holdings over time, and a sector code that allows us to distinguish between such types as mutual fund owners, financial owners (which include mutual funds), industrial (nonfinancial corporate) owners, private (individual) owners, state owners and foreign owners. It is worth emphasizing that this information is never completely revealed to the market in general. Only other owners of the same stock may (for a fee) get the owner list for that stock. Breakdowns on the fraction owned by the owner types we analyze are published on a monthly basis, but never for individual stocks, only for the aggregate market.

In addition to the data on equity ownership we use market data from the Oslo Stock Exchange Data Service (OBI). This source provides stock prices and accounting data. The number of companies on the exchange has increased from 141 in 1989 to 212 in 2003. To avoid problems due to bid ask bounce and stale observations we require the stocks used in the analysis to have a price above NOK 10 (About USD 1.50) and have actual trades a minimum of 20 days during

[3]Both papers include Norway as one of their countries where such a change was enacted, but they strangely use 1992 as the year when it was introduced.

a year. This filter removes an average of 32 stocks per year.[4]

During the period there has been two distinct regimes in the regulation of short sales. Up to the end of 1996 short selling was illegal. In 1996 legislation allowing short sales were introduced, which went into effect on January 1 1997. This motivates splitting our sample into two regimes, 1989–1996 and 1997–2003. While short sales were allowed in 1997, they are costly, and a number of institutional investors have constraints on short sales positions. These constraints are currently being lifted, but during the 1997 to 2003 period they were in place.

## 2.2 Breadth measures

The detailed nature of our ownership data allows us to calculate a number of alternative measures of breadth. As Chen et al. (2002) admits, using the number of mutual fund owners as a proxy for their theoretical concept of breadth leaves something to be desired. Ideally, one would want to consider all owners who are constrained against going short in calculating a measure of decrease in breadth. Their focus on the holdings of mutual funds is presumably also dictated by data availability, since the holdings of mutual funds must be published on a quarterly basis. In our Norwegian data we are not constrained to only the published holdings of mutual funds, we have monthly observations of the holdings of *all* owners. While we can use these data to replicate the Chen et al. measures, we can also consider a number of alternative measures.

We will start by considering the same breadth measure which is the focus of Chen et al., which we will term *CHS:BREADTH*. To calculate this measure for a stock at time $t$ we find the number of mutual fund owners long in the stock. To normalize this number we follow Chen et al. and divide by the total number of mutual fund owners in the market at the date.[5] In addition to the Chen et al. measure focusing on mutual fund ownership we consider a number of alternatives. We first increase the focus only slightly, from only mutual funds to *all* financial owners, and term this *No Financial Owners*. This include mutual funds, but also include such owners as banks and insurance companies. We next increase the scope of the breadth measure to include all significant owners of a company, only leaving out owners with less than hundred shares.[6] The variable is *No Owners*. One argument which has been made for using financial owners/mutual funds is that these are most likely to be better informed. To investigate this view we consider the group of owners that can be argued is most likely *not* to be informed, private, or individual, owners, and call this breadth measure *No Individual Owners*.[7] A final measure we will consider is a measure of ownership concentration, which can be viewed as the

[4]See Ødegaard (2004) for more details about asset pricing data for the Oslo Stock Exchange.

[5]Note that this total is constant across firms, hence ranking by this measure is equivalent to ranking by the number of mutual fund owners. Chen et al. also considers a number of alternative breadth measures, such as the number of mutual funds *leaving* and *entering* a given stock. We have also considered these breadth measures, but leave them out for space considerations. The results are available upon request.

[6]Hundred shares is the minimal unit for transactions on the exchange. Transactions of less than hundred shares are typically carried out off the exchange, with higher transaction costs, and it is hard to believe that they carry much information. Leaving out such small owners is thus an attempt to reduce noise. This restriction actually removes quite a large number of owners, it reduces the average number of owners from about 3800 to about 2000.

[7]Note that in this measure we also remove owners with less than one hundred shares.

inverse of breadth. The motivation for also considering ownership concentration is that this can give some insight into the mechanism by which breadth is reduced. If for example mutual fund owners sell their shares, and the shares are taken up by other owners who already have a stake in the company, concentration is increased. But if mutual funds unload their stocks on owners who do not have a stake in the company, ownership concentration is unchanged. Considering concentration can thus allow us to distinguish such cases. The concentration measure we use is the *Herfindahl Index,* the sum of squared ownership fractions. This is a well known measure that takes account of differences in relative size.[8]

Panel A of table 1 provides some descriptive statistics for these potential breadth measures, for the whole sample and split into five groups based on firm size. In the paper we will focus on *changes* in the breadth levels. The primary reason for focusing on changes is due to the nature of the underlying model. When traders receive information, this information is reflected in their trading. In the case of traders receiving negative information, they will sell out the stock. A change in the number of owners is therefore likely to reflect new information. What we want to measure is the extent to which this *new* information is reflected in prices, which causes us to focus on changes. Another reason for not looking at absolute levels of breadth is obvious from looking at panel A of table 1. All the breadth measures in the table covary with firm size. Looking at levels of breadth is therefore very likely to confuse breadth with the well known size effect. Panel B and C of table 1 details breadth measures for changes, respectively monthly and quarterly. In addition to breadth measures, a number of other variables are used. Panel D of table 1 gives some descriptive detail about these variables.

Another important aspect of the breadth measures is to what extent they covary. If for example the Chen et al. measure captures most of the information in breadth, breadth measures using mutual funds may be an reasonable proxy for the total breadth of a company. To speak to this table 2 shows correlations between the breadth measures, both in levels and in changes. All breadth measures are positively correlated, except the Herfindahl concentration measure, which has a negative correlation with all the other breadth measures. This last is to be expected, since concentration really is the inverse of breadth, an increase in the number of owners should lead to a decrease in concentration. More interesting is the fact that measures concerning breadth of financial owners has a relatively low correlation with measures which also accounts for other owners. The breadth measures thus at least has the potential to measure different properties.

# 3 Methods

We first study the relationship between changes in breadth and subsequent returns. We sort stocks into portfolios based on a measure of breadth, and calculate portfolio returns. Figure 1 illustrates the idea. We sort portfolios at time $t$ by looking at changes between date $t-1$ and $t$, and then look at realized returns from $t$ to $t+1$. We will consider both monthly and quarterly horizons.

[8] This measure is often used in corporate governance studies, see e.g. Demsetz and Lehn (1985).

A problem with looking at realized returns is that expected returns could differ across portfolios for other reasons than breadth, since breadth can be correlated with other determinants of asset prices. To attempt to control for this problem we estimate the Fama and French (1996) three factor model (1) for Norway,[9]

$$E[R_i] - R_f = b_i \left(E[R_m] - R_f\right) + s_i E\left[\text{SMB}\right] + h_i E\left[\text{HML}\right] \tag{1}$$

where $R_f$ is the risk free rate, $R_m$ the the return on a market index, SMB the return on a portfolio difference of small stocks and large stocks and HML the return on a portfolio difference of high book to market to low book to market stocks. At any point in time, the parameters of the model are estimated from the linear regression

$$R_{i\tau} - R_{f\tau} = \hat{\alpha}_i + \hat{b}_i(R_{m\tau} - R_{f\tau}) + \hat{s}_i \text{SMB}_\tau + \hat{h}_i \text{HML}_\tau + \varepsilon_\tau$$

using monthly data for the preceding five years.

Excess returns are then calculated as

$$er_{it}^{ff} = R_{it} - \Big(R_{ft} + \hat{b}_i(R_{mt} - R_{ft}) + \hat{s}_i \text{SMB}_t + \hat{h}_i \text{HML}_t\Big)$$

An alternative way of investigating whether breadth is important in the crossection is by using Fama and MacBeth (1973) type regressions. This is the classical approach to testing asset pricing models, which has the added benefit of being able to control for several relevant factors simultaneously. It is a "rolling regression," where one uses one crossection at a time to estimate determinants of asset returns, and average the estimated parameters across time. Figure 2 illustrates the Fama and MacBeth method for doing crossectional regressions. Each period $t$ a crossectional regression $r_t = \mathbf{X}_t \beta_t$ is run, where $r_t$ is the dependent variable, which typically is an asset return. $\mathbf{X}_t$ is a set of explanatory variables and $\beta_t$ the set of estimates. The model parameters are estimated by taking the (time series) average of the estimated $\beta_t$'s. To test for significance one tests whether the averages of the $\beta_t$ estimates are different from zero.

A potential problem with using the Fama French corrections is that US studies show that breadth is correlated with the Fama French factors, such as size. By correcting for size we may in fact be removing part of the breadth effect. This is problematic due to the atheoretical nature of the Fama French factors. Since the Fama French factors have limited theoretical justification, should we not use factors justified by theory instead of these? Since there is a theory arguing that breadth is relevant, should we not use that? These issues should be kept in mind when interpreting the results.

[9] An alternative to using asset pricing model residuals would have been to use a method of finding "matching" portfolios constructed on the basis of e.g. industry, size, and book/market. This is essentially infeasible for the Norwegian asset market, since the crossection is so small, of between 100 and 200 stocks. Matching on more than two criteria would leave less assets than desired portfolios. We therefore impose the Fama French model as a feasible method of controlling for expected return differences.

# 4 Determinants of breadth

In this section we will look at whether the various measures of breadth are related to other variables. Table 3 shows results for Fama and MacBeth (1973) style regressions. Note that a number of variables found to be important for asset pricing are related to the various breadth measures, such as firm size, momentum, liquidity, book/market. There is some crossectional variation: For example, changes in the fraction of firms owned by mutual funds is (naturally) important for the breadth measures that concern financial owners, *CHS:BREADTH,* and *No Financial Owners,* but not important for the measures concerned with a wider definition of breadth, *No Owners* and *No Individual Owners.* Interestingly, changes in the fraction of mutual funds ownership is also found to be important for the concentration measure *Herfindahl Index.* This could be due to the fact that mutual fund owners tend to have large holdings, and when they for example sell out, these stocks are spread out on more, relatively smaller, owners.

The fact that the standard factors found to be important for asset pricing, size, B/M, momentum and liquidity, are found to be linked to some measure of breadth, although there are some differences across breadth measures, matches US results in Chen et al. (2002), which also found relations between their breadth measure and the standard asset pricing factors.

# 5 Does breadth changes predict stock returns?

In this section we investigate whether the various breadth measures are linked to stock returns in the crossection. This is a central prediction of the Miller (1977) model, that stocks with bad news will have a lower subsequent return.

## 5.1 Does breadth changes predict quarterly returns?

We start by looking at relatively longer horizons matching the horizon of Chen et al. (2002), namely quarterly returns. Table 4 shows returns for 10 portfolios sorted on the various breadth measures. The portfolios are constructed by measuring changes in breadth over one quarter, and calculating returns over the next quarter.

Looking first at the measure matching Chen et al., we find results similar to theirs. The portfolio with lowest *CHS:*$\Delta$*BREADTH* has a significantly lower return than the one with the highest *CHS:*$\Delta$*BREADTH.* The difference is 2.72 percent on a quarterly basis, or about 11 percent per year, which certainly is an economically significant difference. Hence, that institutional owners got out of the stock in the last quarter is a negative signal. So far this is consistent with the Miller hypothesis. But if we now look at the alternative measures of breadth, we find evidence not consistent with the Miller hypothesis. If we only increase the measure to also include other financial owners, we do no longer find any significant difference, although the low breadth portfolio still has the lowest return. If we increase the breadth measure to include all owners, or all individual owners, we find opposite results. Here it is the portfolio with the largest increase in owners which has the lowest return. If we think all owners are equal, this count as evidence against the Miller hypothesis, in particular when looking across sub-periods, we find that this

result is most pronounced in the first subperiod, where short sales were illegal, and all owners were short sales constrained.

Even if we believe that individual owners are relatively uninformed, we should not find any significant difference. We should certainly not find that the stocks in which the number of individual owners *increase* the most are those that perform worst.

Recall that we had two models in mind as are potential explanations for the fact that mutual fund trading can predict stock returns. One that mutual funds are samples from all owners, where each owner is as likely to have information. This corresponds to the model of Chen et al. (2002). The alternative explanation was that mutual funds are samples from a pool of better informed traders. In the first case, when mutal funds have negative information, other owners have it too. These other owers should be doing the same as mutual funds, reducing their stakes to zero. In the case of mutual funds being better informed, we should not see this effect in the other groups. Our results support the second explanation, that mutual funds are better informed. The fact that it is only the mutual funds that have the hypothesised effect, that we find opposite effects for individual investors, and find no significant effect on concentration are all supportive of the second explanation. Only the first effect is consistent with the first explanation.

A problem with the results involving realized portfolio returns is that expected returns could differ across the breadth portfolios for other reasons than breadth, since breadth can be correlated with other determinants of asset prices. To attempt to control for this problem we estimate residuals from the Fama and French three factor model. Table 5 shows averages of these residuals for the same portfolios as in table 4. While the overall impression from the raw return results remain, the results are not as significant. The result that remains most significant is the result on individual owners. This is still indicative of the second explanation above, that somebody is trading at the expense of individual investors.

To put some perspective on why the approach using Fama French residuals have lower significance we apply Fama and MacBeth (1973) regressions, where we can actually see what variables is contributing most to explaining the crossection of asset returns. Table 6 shows the results of doing Fama Macbeth style regressions with a number of additional explanatory variables added to measures of breadth.

The table shows that the sign on the coefficients on breadth are positive on changes in financial ownership, and negative for the alternative, broader measures of breadth, which is consistent with the earlier results. However, after controlling for the other variables the breadth measures are not significant predictors. Note that the most consistently significant factor is the well known Fama and French (1992) factor firm size. The other Fama and French (1992) factor, book to market, is important in the second subperiod, but not in the first. However, that we do not get any significant effects for the breadth measures is not particularly surprising given the very low number of observations (19 observations in the first subperiod, with 6 explanatory variables.) This is an obvious motivation for going to the higher frequency of monthly observations, to which we now turn.

### 5.2 Does breadth changes predict next months returns?

As just mentioned, using monthly observations instead of quarterly will increase the number of observations, and possibly improve the accuracy of estimates. There is another reason for going to higher frequency observations, which is the underlying model, either it being the Miller (1977) or the Diamond and Verrecchia (1987) type of intuition. Both models have the implication that information is continually revealed. In the Miller model this happens when the more pessimistic investors become marginal, in the Diamond and Verrecchia model it is the continued trading which reveals information. Neither of these models has strong predictions about the actual time frame over which information is revealed. For the time for corporate information to be revealed to the market, a month seems more reasonable than the quarterly horizon of the previous subsection. We therefore redo the analysis of the previous subsection on monthly data. The results are shown in tables 7 (portfolio returns), 8 (Fama French residuals) and 9 (Fama Macbeth regressions).

Surprisingly, the case of monthly observations leads to somewhat different conclusions than the earlier quarterly results. Let us first look at the Chen et al. breadth measure, which concerns the trading by mutual funds. Theory predicts that the low breadth firms should have lower returns, and that the effect should be stronger in the first subperiod, where short-selling was restricted. Instead, we observe the opposite. In the first period the low $CHS{:}\Delta BREADTH$ portfolio has the highest return, which is significantly different in the case of Fama French residuals shown in table 8. In the second subperiod we see the hypothesized pattern, with the low $CHS{:}\Delta BREADTH$ portfolio having the lowest return and residual. For the alternative breadth measures we see no strong effects over a monthly horizon.

These results are puzzling. With the focus on models of information revelation, we should expect the quarterly results to also be there on a monthly frequency. One difference may be that there is more noise in the measurement of the change in breadth, quarterly changes may be more significant. But one still should not expect the reversal of the quarterly effects of mutual fund ownership which we observe in the first subperiod.

### 5.3 Is there a contemporaneous effect?

The puzzling difference between our findings with quarterly and monthly returns leads us to looking at contemporaneous changes in breadth and stock returns. We want to understand what is causing these differences. A potential explanation is that the actual trading is causing prices to move immediately. In an interesting paper that looks at short sales in Australia, Aitken et al. (1998) show that short sales are almost instantaneously bad news, increases in short interest leads the stock price to fall immediately. While we are not looking at such public events as publication of short sales, the actual trading can still reveal information, as in the Diamond and Verrecchia (1987) model. This suggest looking at even shorter horizon than monthly. However, our ownership data, which only has monthly observations of holdings, do not allow us to go to a higher frequency. However, what we can do is to look at returns and breadth changes within the same month. The problem with this is that we do not observe what happens first, the change in breadth and subsequent return, or is the change in breadth a result of return innovations? However, observing the change in breadth and return is informative, even if we can not make any claims about causality.

Tables 10 (portfolio returns), 11 (Fama French residuals) and 12 (Fama MacBeth regressions) show the results of looking at monthly returns and breadth changes in the same month. All tables tell the same story. Returns are higher in months with mutual funds buying and individual investors selling, and opposite, returns are lower in months with mutual funds selling and individual investors buying.

Although one cannot make causality claims with such monthly observations, since we do not observe whether returns or quantities "move first," the evidence is at least consistent with some of the information in mutual funds trades being impounded in prices immediately, but some of being more long lived, and only being impounded in prices over quarterly horizons. One explanation for the results over the subsequent month is that the simultaneous effects affects prices for a while, before prices move again when the long lived information is revealed, which may explain that the effects are there for the quarterly case but not for the monthly case.

## 6 Conclusion

We have used data for Norway to take another look at the results on breadth of Chen et al. (2002). We confirm some of their results, but also show that their findings is mainly due to the mutual fund sector. Calculating broader breadth measures we find results opposite to theirs. Their results are thus more likely to be due to better information reflected in mutual funds trades.

We also show that these results are dependent on which horizon at which they are calculated. Looking at monthly horizons instead of quarterly horizons, we do not find the effects, in fact, for the first part of the period, when short sales are restricted, we find an opposite effect.

To investigate the causes of this we have also looked at contemporaneous monthly returns. Although one cannot make causality claims with such monthly observations, since we do not

observe whether returns or quantities "move first", the evidence is at least consistent with some of the information in mutual funds trades being impounded in prices immediately, while some of the information being more long-lived, and only impounded in prices over quarterly horizons.

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**Figure 1** Timing of portfolio sort calculations

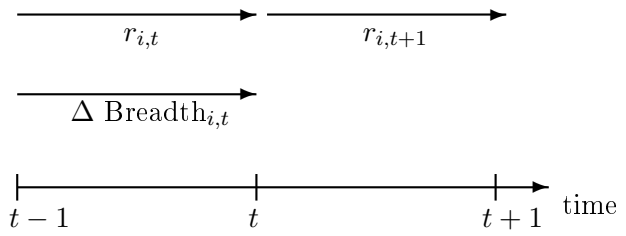

**Figure 2** Fama and MacBeth type regressions

| Time: | $t-1$ | | $t$ | $t+1$ | $\ldots$ | | |
|---|---|---|---|---|---|---|---|
| Stock | 1 | $r_{1,t}$ | $\mathbf{X}_{1,t}$ | $r_{1,t+1}$ | $\mathbf{X}_{1,t+1}$ | $\ldots$ | |
| | 2 | $r_{2,t}$ | $\mathbf{X}_{2,t}$ | $r_{2,t+1}$ | $\mathbf{X}_{2,t+1}$ | $\ldots$ | |
| | | | $\vdots$ | | $\vdots$ | | |
| | $n$ | $r_{n,t}$ | $\mathbf{X}_{n,t}$ | $r_{n,t+1}$ | $\mathbf{X}_{n,t+1}$ | $\ldots$ | |
| | | $r_t = \mathbf{X}_t\hat{\beta}_t$ | | $r_{t+1} = \mathbf{X}_{t+1}\hat{\beta}_{t+1}$ | | $\ldots$ | $\rightarrow \text{average}(\hat{\beta}_t)$ |

**Table 1** Descriptive statistics, split on size portfolios

Panel A. Levels of Breadth

| Variable | | Size quintile | | | | |
|---|---|---|---|---|---|---|
| | All firms | 1(smallest) | 2 | 3 | 4 | 5(largest) |
| CHS:BREADTH | 0.170 | 0.033 | 0.067 | 0.112 | 0.206 | 0.433 |
| No Mutual Fund Owners | 12 | 2 | 4 | 7 | 14 | 35 |
| No Financial Owners | 48 | 14 | 21 | 32 | 54 | 120 |
| No Individual Owners $\geq$ 100 Shares | 1592 | 636 | 780 | 1062 | 1344 | 4140 |
| No Owners $\geq$ 100 Shares | 1907 | 740 | 938 | 1280 | 1657 | 4922 |
| Herfindahl Index | 0.142 | 0.141 | 0.133 | 0.137 | 0.147 | 0.154 |
| Mutual Fund Holdings | 0.064 | 0.028 | 0.056 | 0.072 | 0.081 | 0.080 |

Panel B. Monthly changes in Breadth

| Variable | | Size quintile | | | | |
|---|---|---|---|---|---|---|
| | All firms | 1(smallest) | 2 | 3 | 4 | 5(largest) |
| CHS:$\Delta$BREADTH | -0.017 | -0.003 | -0.005 | -0.009 | -0.019 | -0.051 |
| $\Delta$No Mutual Fund Owners | -0.47 | -0.11 | -0.15 | -0.26 | -0.50 | -1.33 |
| $\Delta$No Financial Owners | 0.09 | -0.12 | -0.09 | -0.00 | 0.00 | 0.67 |
| $\Delta$No Individual Owners $\geq$ 100 Shares | 17.64 | 3.16 | 8.18 | 13.62 | 12.78 | 50.43 |
| $\Delta$No Owners $\geq$ 100 Shares | 18.71 | 2.65 | 8.61 | 13.78 | 13.02 | 55.48 |
| $\Delta$Herfindahl Index | 0.002 | 0.001 | 0.002 | 0.002 | 0.004 | 0.003 |

Panel C. Quarterly changes in Breadth

| Variable | | Size quintile | | | | |
|---|---|---|---|---|---|---|
| | All firms | 1(smallest) | 2 | 3 | 4 | 5(largest) |
| CHS:$\Delta$BREADTH (quarterly) | 0.001 | -0.002 | -0.000 | -0.000 | 0.001 | 0.006 |
| $\Delta$No Mutual Fund Owners (quarterly) | -0.39 | -0.18 | -0.17 | -0.25 | -0.45 | -0.87 |
| $\Delta$No Financial Owners (quarterly) | 0.33 | -0.42 | -0.26 | 0.05 | 0.32 | 1.98 |
| $\Delta$No Individual Owners $\geq$ 100 Shares (quarterly) | 55.08 | 9.82 | 24.06 | 45.66 | 36.52 | 159.33 |
| $\Delta$No Owners $\geq$ 100 Shares (quarterly) | 59.98 | 7.95 | 25.00 | 48.45 | 43.34 | 175.16 |
| $\Delta$Herfindahl Index (quarterly) | 0.003 | 0.001 | 0.000 | 0.004 | 0.005 | 0.006 |

Panel D. Non-breadth variables

| Variable | | Size quintile | | | | |
|---|---|---|---|---|---|---|
| | All firms | 1(smallest) | 2 | 3 | 4 | 5(largest) |
| ln(Equity Value) | 19.94 | 17.75 | 19.04 | 19.90 | 20.77 | 22.25 |
| BK/MKT | 1.07 | 1.85 | 1.08 | 0.87 | 0.87 | 0.70 |
| E/P | 0.22 | 0.40 | 0.44 | 0.10 | 0.09 | 0.09 |
| Monthly Turnover | 0.058 | 0.048 | 0.056 | 0.061 | 0.062 | 0.065 |
| $r_{i,t-12,t}$ | 0.194 | 0.036 | 0.131 | 0.210 | 0.260 | 0.333 |
| $r_{i,t}$ | 0.016 | 0.009 | 0.018 | 0.017 | 0.017 | 0.019 |
| $r_{i,t+q}$ | 0.050 | 0.022 | 0.056 | 0.055 | 0.052 | 0.063 |

The tables provides descriptive statistics for variables used in the paper. The table gives averages for all observations, and averages for five portfolios sorted by equity size. Panel A details the potential breadth measures. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Mutual Fund Owners:* number of mutual funds long in a stock, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares, *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners and *Mutual Fund Holdings:* fraction of the company owned by mutual funds. Panels B and C shows *changes*, respectively monthly and quarterly, of the same variables as in panel A. The symbol $\Delta$ signifies changes from one period to the next. If no qualification the changes are monthly. Panel D details variables which are not breadth measures. Here *Equity Value:* market value of the firm's equity, *BK/MKT:* Book to Market ratio, *E/P:* latest ratio of earnings to price, *Monthly turnover:* stock turnover measured as the fraction of the company's equity traded during a month, $r_{i,t-12,t}$*:* stock return for the previous year, $r_i$*:* monthly stock return, $er_i^{ff}$*:* monthly residual from a Fama French three factor model, and where $q$ signifies quarterly returns. The calculations use data for the whole period 1989–2003.

**Table 2** Correlations between breadth measures

Panel B. Levels of breadth

| | CHS:BREADTH | No Financial Owners | No Individual Owners $\geq$ 100 Shares | No Owners $\geq$ 100 Shares |
|---|---|---|---|---|
| No Financial Owners | 0.92 | | | |
| No Individual Owners $\geq$ 100 Shares | 0.50 | 0.63 | | |
| No Owners $\geq$ 100 Shares | 0.54 | 0.67 | 1.00 | |
| Herfindahl Index | -0.12 | -0.21 | -0.05 | -0.07 |

Panel B. Monthly changes in breadth

| | CHS:$\Delta$BREADTH | $\Delta$No Financial Owners | $\Delta$No Individual Owners $\geq$ 100 Shares | $\Delta$No Owners $\geq$ 100 Shares |
|---|---|---|---|---|
| $\Delta$No Financial Owners | 0.76 | | | |
| $\Delta$No Individual Owners $\geq$ 100 Shares | 0.17 | 0.35 | | |
| $\Delta$No Owners $\geq$ 100 Shares | 0.20 | 0.40 | 0.98 | |
| $\Delta$Herfindahl Index | -0.29 | -0.37 | -0.19 | -0.21 |

Panel B. Quarterly changes in breadth

| | CHS:$\Delta$BREADTH (quarterly) | $\Delta$No Financial Owners (quarterly) | $\Delta$No Individual Owners $\geq$ 100 Shares (quarterly) | $\Delta$No Owners $\geq$ 100 Shares (quarterly) |
|---|---|---|---|---|
| $\Delta$No Financial Owners (quarterly) | 0.80 | | | |
| $\Delta$No Individual Owners $\geq$ 100 Shares (quarterly) | 0.16 | 0.35 | | |
| $\Delta$No Owners $\geq$ 100 Shares (quarterly) | 0.18 | 0.39 | 0.98 | |
| $\Delta$Herfindahl Index (quarterly) | -0.30 | -0.43 | -0.22 | -0.23 |

The tables show contemporaneous correlations between the breadth measured considered in the paper. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol $\Delta$ signifies changes from one period to the next. Data for the whole period 1989–2003.

**Table 3** Fama Macbeth regression, determinants of breadth

Panel A. Whole Period 1989–2003

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CHS:ΔBREADTH | | ΔNo Financial Owners | | ΔNo Owners ≥ 100 Shares | | ΔNo Individual Owners ≥ 100 Shares | | ΔHerfindahl Index | |
| constant | -0.00020 | (0.97) | -3.87014 | (0.01) | -214.58737 | (0.02) | -172.38443 | (0.02) | -0.00144 | (0.66) |
| Δ Mutual Fund Holdings | 1.03718 | (0.00) | 136.06498 | (0.00) | -87.40737 | (0.86) | -153.88713 | (0.74) | -0.29377 | (0.00) |
| ln(Equity Value) | 0.00002 | (0.94) | 0.19131 | (0.01) | 10.25889 | (0.02) | 8.26630 | (0.02) | 0.00004 | (0.81) |
| $r_{i,t-12,t}$ | 0.00339 | (0.00) | 0.54645 | (0.00) | -14.73352 | (0.00) | -15.87941 | (0.00) | 0.00058 | (0.21) |
| Monthly turnover | 0.00946 | (0.28) | 6.24362 | (0.00) | 315.58451 | (0.00) | 274.17516 | (0.00) | 0.01398 | (0.18) |
| BK/MKT | -0.00125 | (0.03) | -0.15544 | (0.14) | -0.21665 | (0.96) | -0.13218 | (0.97) | 0.00164 | (0.00) |
| E/P | -0.00212 | (0.50) | 0.63724 | (0.45) | 28.89738 | (0.41) | 22.14597 | (0.47) | -0.00351 | (0.24) |
| average $\bar{R}^2$ | 0.30 | | 0.24 | | 0.17 | | 0.19 | | 0.21 | |
| Number of periods | 129 | | 129 | | 129 | | 129 | | 126 | |

Panel B. First Subperiod 1989–1996

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CHS:ΔBREADTH | | ΔNo Financial Owners | | ΔNo Owners ≥ 100 Shares | | ΔNo Individual Owners ≥ 100 Shares | | ΔHerfindahl Index | |
| constant | -0.00701 | (0.50) | -8.31031 | (0.00) | -214.62439 | (0.24) | -166.65148 | (0.22) | -0.01039 | (0.07) |
| Δ Mutual Fund Holdings | 1.17169 | (0.00) | 101.37930 | (0.00) | 217.48572 | (0.69) | 224.20718 | (0.62) | -0.29471 | (0.00) |
| ln(Equity Value) | 0.00039 | (0.47) | 0.41904 | (0.00) | 10.54463 | (0.25) | 8.32497 | (0.22) | 0.00050 | (0.07) |
| $r_{i,t-12,t}$ | 0.00208 | (0.19) | 0.12999 | (0.52) | -15.55265 | (0.05) | -15.91159 | (0.05) | 0.00080 | (0.25) |
| Monthly turnover | 0.00741 | (0.70) | 7.61506 | (0.00) | 112.66876 | (0.34) | 116.93950 | (0.33) | -0.01555 | (0.03) |
| BK/MKT | -0.00187 | (0.14) | -0.10172 | (0.60) | 2.96832 | (0.74) | 2.45051 | (0.75) | 0.00283 | (0.01) |
| E/P | -0.00321 | (0.64) | 2.65015 | (0.16) | 70.26849 | (0.23) | 46.50810 | (0.32) | -0.00997 | (0.13) |
| average $\bar{R}^2$ | 0.29 | | 0.24 | | 0.18 | | 0.20 | | 0.21 | |
| Number of periods | 51 | | 51 | | 51 | | 51 | | 48 | |

Panel C. Second Subperiod 1997–2003

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CHS:ΔBREADTH | | ΔNo Financial Owners | | ΔNo Owners ≥ 100 Shares | | ΔNo Individual Owners ≥ 100 Shares | | ΔHerfindahl Index | |
| constant | 0.00426 | (0.48) | -0.96695 | (0.62) | -214.56317 | (0.01) | -176.13290 | (0.03) | 0.00407 | (0.28) |
| Δ Mutual Fund Holdings | 0.94924 | (0.00) | 158.74408 | (0.00) | -286.76055 | (0.71) | -401.10264 | (0.57) | -0.29320 | (0.00) |
| ln(Equity Value) | -0.00022 | (0.47) | 0.04241 | (0.66) | 10.07206 | (0.02) | 8.22794 | (0.03) | -0.00024 | (0.20) |
| $r_{i,t-12,t}$ | 0.00424 | (0.00) | 0.81876 | (0.00) | -14.19793 | (0.04) | -15.85838 | (0.01) | 0.00044 | (0.47) |
| Monthly turnover | 0.01079 | (0.13) | 5.34691 | (0.01) | 448.26019 | (0.00) | 376.98310 | (0.00) | 0.03215 | (0.04) |
| BK/MKT | -0.00085 | (0.10) | -0.19056 | (0.12) | -2.29914 | (0.47) | -1.82086 | (0.51) | 0.00091 | (0.02) |
| E/P | -0.00142 | (0.58) | -0.67889 | (0.26) | 1.84705 | (0.97) | 6.21689 | (0.88) | 0.00046 | (0.85) |
| average $\bar{R}^2$ | 0.30 | | 0.24 | | 0.17 | | 0.18 | | 0.21 | |
| Number of periods | 78 | | 78 | | 78 | | 78 | | 78 | |

The table summarizes results from Fama and MacBeth style regressions with breadth measures as the dependent variable. Each column is the result of a regression with the breadth measure listed at the top of the column as the dependent variable. The crossectional regression with the breadth measure as dependent variable is performed on each date. The reported estimates are time series averages of these regression coefficients. The numbers in parenthesis are p-values for the hypothesis that the coefficient is equal to zero. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. Explanatory variables: *Mutual Fund Holdings:* fraction of the company owned by mutual funds, *Equity Value:* market value of the firm's equity, $r_{i,t-12,t}$*:* stock return for the previous year, *Monthly turnover:* stock turnover measured as the fraction of the company's equity traded during a month, *BK/MKT:* Book to Market ratio and *E/P:* latest ratio of earnings to price. The symbol Δ signifies changes from one period to the next.

**Table 4** Quarterly returns of portfolios sorted on various breadth measures

Panel A. Whole Period 1989–2003

| | CHS:ΔBREADTH (quarterly) | ΔNo Financial Owners (quarterly) | ΔNo Owners ≥ 100 Shares (quarterly) | ΔNo Individual Owners ≥ 100 Shares (quarterly) | ΔHerfindahl Index (quarterly) |
|---|---|---|---|---|---|
| P1 (low) | 3.33 | 3.79 | 4.18 | 5.68 | 3.79 |
| P2 | 4.44 | 6.60 | 5.20 | 4.97 | 6.17 |
| P3 | 5.83 | 6.25 | 5.94 | 6.65 | 4.08 |
| P4 | 6.37 | 4.16 | 4.18 | 3.37 | 3.26 |
| P5 | 6.44 | 6.62 | 5.76 | 3.99 | 4.67 |
| P6 | 5.36 | 4.53 | 4.33 | 6.32 | 4.63 |
| P7 | 3.53 | 4.68 | 4.88 | 5.28 | 4.58 |
| P8 | 4.65 | 4.39 | 7.82 | 5.25 | 4.91 |
| P9 | 5.65 | 5.12 | 6.58 | 6.30 | 4.73 |
| P10 (high) | 6.05 | 4.41 | 2.25 | 2.30 | 3.28 |
| P1-P10 | -2.716 | -0.625 | 1.935 | 3.384 | 0.509 |
| pvalue | [0.09] | [0.65] | [0.10] | [0.02] | [0.69] |

Panel B. First Subperiod 1989–1996

| | CHS:ΔBREADTH (quarterly) | ΔNo Financial Owners (quarterly) | ΔNo Owners ≥ 100 Shares (quarterly) | ΔNo Individual Owners ≥ 100 Shares (quarterly) | ΔHerfindahl Index (quarterly) |
|---|---|---|---|---|---|
| P1 (low) | 6.48 | 7.22 | 6.96 | 10.57 | 9.51 |
| P2 | 8.49 | 12.69 | 10.07 | 8.95 | 10.52 |
| P3 | 9.94 | 10.09 | 10.40 | 12.72 | 6.95 |
| P4 | 11.15 | 9.89 | 7.34 | 6.03 | 6.22 |
| P5 | 7.78 | 9.47 | 9.29 | 6.82 | 6.76 |
| P6 | 8.20 | 7.09 | 8.55 | 10.39 | 9.04 |
| P7 | 7.40 | 7.53 | 8.82 | 9.77 | 5.63 |
| P8 | 8.42 | 8.29 | 12.61 | 8.81 | 9.72 |
| P9 | 10.69 | 9.63 | 11.63 | 10.04 | 7.59 |
| P10 (high) | 11.11 | 8.46 | 5.01 | 4.71 | 7.93 |
| P1-P10 | -4.622 | -1.240 | 1.947 | 5.856 | 1.576 |
| pvalue | [0.06] | [0.46] | [0.39] | [0.04] | [0.44] |

Panel C. Second Subperiod 1997–2003

| | CHS:ΔBREADTH (quarterly) | ΔNo Financial Owners (quarterly) | ΔNo Owners ≥ 100 Shares (quarterly) | ΔNo Individual Owners ≥ 100 Shares (quarterly) | ΔHerfindahl Index (quarterly) |
|---|---|---|---|---|---|
| P1 (low) | 1.23 | 1.50 | 2.33 | 2.43 | 0.62 |
| P2 | 1.75 | 2.54 | 1.95 | 2.31 | 3.76 |
| P3 | 3.09 | 3.69 | 2.96 | 2.60 | 2.48 |
| P4 | 3.18 | 0.35 | 2.08 | 1.60 | 1.62 |
| P5 | 5.55 | 4.72 | 3.40 | 2.11 | 3.51 |
| P6 | 3.47 | 2.82 | 1.51 | 3.60 | 2.17 |
| P7 | 0.94 | 2.78 | 2.26 | 2.29 | 4.00 |
| P8 | 2.13 | 1.79 | 4.62 | 2.88 | 2.23 |
| P9 | 2.29 | 2.12 | 3.22 | 3.81 | 3.14 |
| P10 (high) | 2.68 | 1.72 | 0.40 | 0.69 | 0.70 |
| P1-P10 | -1.445 | -0.215 | 1.927 | 1.736 | -0.084 |
| pvalue | [0.49] | [0.91] | [0.13] | [0.18] | [0.96] |

The table summarizes the returns for 10 portfolios sorted on the breadth measure specified at the top of each column. Returns are measured as percentage quarterly return (not annualized). Each portfolio is constructed by measuring the change in the breadth measure over a period, sorting the available stocks into portfolios using this measure, and then calculating the average return over the following period. The portfolios are equally weighted. The last two rows report the result of a test of difference of means of the two extreme portfolios. The row marked *P1-P10* reports the difference in means, the last row shows the p-value (in square brackets) of the null hypothesis that this difference is equal to zero. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.

**Table 5** Quarterly Fama French Residuals for portfolios sorted on various breadth measures

Panel A. Whole Period 1989–2003

| | CHS:ΔBREADTH (quarterly) | ΔNo Financial Owners (quarterly) | ΔNo Owners ≥ 100 Shares (quarterly) | ΔNo Individual Owners ≥ 100 Shares (quarterly) | ΔHerfindahl Index (quarterly) |
|---|---|---|---|---|---|
| P1 (low) | -5.43 | -4.86 | -3.76 | -2.86 | -5.48 |
| P2 | -3.58 | -2.63 | -3.71 | -3.78 | -2.84 |
| P3 | -3.37 | -2.34 | -3.25 | -2.14 | -2.80 |
| P4 | -1.34 | -1.63 | -3.32 | -3.62 | -1.56 |
| P5 | 0.27 | -0.70 | 0.51 | -1.37 | -1.08 |
| P6 | -0.25 | -1.58 | -1.58 | -0.28 | -1.10 |
| P7 | -2.03 | -2.40 | -1.67 | -1.70 | -1.58 |
| P8 | -2.73 | -3.43 | -1.12 | -3.21 | -3.12 |
| P9 | -2.60 | -2.89 | -2.45 | -1.90 | -2.29 |
| P10 (high) | -4.61 | -4.22 | -5.99 | -6.13 | -4.67 |
| P1-P10 | -0.817 | -0.644 | 2.228 | 3.275 | -0.810 |
| pvalue | [0.52] | [0.65] | [0.08] | [0.01] | [0.58] |

Panel B. First Subperiod 1989–1996

| | CHS:ΔBREADTH (quarterly) | ΔNo Financial Owners (quarterly) | ΔNo Owners ≥ 100 Shares (quarterly) | ΔNo Individual Owners ≥ 100 Shares (quarterly) | ΔHerfindahl Index (quarterly) |
|---|---|---|---|---|---|
| P1 (low) | -3.73 | -4.73 | -3.56 | -1.57 | -3.10 |
| P2 | -3.03 | -0.71 | -1.92 | -2.90 | -2.84 |
| P3 | -2.42 | -2.05 | -2.94 | -1.17 | -2.34 |
| P4 | -0.56 | 0.38 | -3.42 | -3.42 | -1.71 |
| P5 | 0.31 | -0.66 | 2.13 | -1.17 | -1.83 |
| P6 | -1.96 | -2.56 | -1.03 | -0.10 | 1.88 |
| P7 | -1.80 | -2.86 | -1.66 | -0.85 | -2.30 |
| P8 | -2.40 | -2.74 | -0.68 | -3.10 | -2.25 |
| P9 | -1.21 | -0.95 | -1.99 | -1.23 | -2.04 |
| P10 (high) | -4.23 | -3.99 | -5.90 | -6.37 | -3.53 |
| P1-P10 | 0.502 | -0.742 | 2.338 | 4.808 | 0.435 |
| pvalue | [0.75] | [0.75] | [0.17] | [0.02] | [0.87] |

Panel C. Second Subperiod 1997–2003

| | CHS:ΔBREADTH (quarterly) | ΔNo Financial Owners (quarterly) | ΔNo Owners ≥ 100 Shares (quarterly) | ΔNo Individual Owners ≥ 100 Shares (quarterly) | ΔHerfindahl Index (quarterly) |
|---|---|---|---|---|---|
| P1 (low) | -6.57 | -4.95 | -3.89 | -3.72 | -6.80 |
| P2 | -3.94 | -3.91 | -4.90 | -4.37 | -2.84 |
| P3 | -4.00 | -2.53 | -3.46 | -2.79 | -3.06 |
| P4 | -1.85 | -2.98 | -3.26 | -3.76 | -1.47 |
| P5 | 0.25 | -0.73 | -0.56 | -1.50 | -0.67 |
| P6 | 0.89 | -0.93 | -1.96 | -0.40 | -2.76 |
| P7 | -2.18 | -2.09 | -1.68 | -2.27 | -1.19 |
| P8 | -2.94 | -3.89 | -1.42 | -3.28 | -3.61 |
| P9 | -3.53 | -4.18 | -2.76 | -2.35 | -2.44 |
| P10 (high) | -4.87 | -4.38 | -6.04 | -5.97 | -5.30 |
| P1-P10 | -1.697 | -0.579 | 2.155 | 2.252 | -1.501 |
| pvalue | [0.35] | [0.75] | [0.23] | [0.16] | [0.38] |

The table summarizes returns in excess of the Fama French three factor model for 10 portfolios sorted on the breadth measure specified at the top. Each portfolio is constructed by measuring the change in the breadth measure over a period, sorting the available stocks into portfolios using this measure, and then calculating the average return over the following period. Returns are measured as percentage quarterly returns (not annualized). The portfolios are equally weighted. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.

**Table 6** Fama Macbeth style regression of determinants of next quarters returns

Panel A. Whole Period 1989–2003

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | |
| constant | 0.43659 | (0.00) | 0.44571 | (0.00) | 0.43193 | (0.00) | 0.43263 | (0.00) | 0.44190 | (0.00 |
| ln(Equity Value) | -0.01836 | (0.00) | -0.01876 | (0.00) | -0.01805 | (0.00) | -0.01806 | (0.00) | -0.01825 | (0.00 |
| BK/MKT | -0.02268 | (0.30) | -0.02411 | (0.26) | -0.02467 | (0.24) | -0.02463 | (0.25) | -0.03445 | (0.11 |
| $r_{i,t-12,t}$ | 0.00912 | (0.74) | 0.00876 | (0.75) | 0.01014 | (0.72) | 0.01059 | (0.71) | 0.01206 | (0.68 |
| Quarterly turnover | 0.01466 | (0.73) | 0.01496 | (0.73) | 0.02809 | (0.51) | 0.02576 | (0.54) | -0.02369 | (0.55 |
| CHS:ΔBREADTH (quarterly) | 0.10208 | (0.25) | | | | | | | | |
| ΔNo Financial Owners (quarterly) | | | 0.00030 | (0.55) | | | | | | |
| ΔNo Owners ≥ 100 Shares (quarterly) | | | | | -0.00003 | (0.13) | | | | |
| ΔNo Individual Owners ≥ 100 Shares (quarterly) | | | | | | | -0.00003 | (0.22) | | |
| ΔHerfindahl Index (quarterly) | | | | | | | | | -0.22847 | (0.24 |
| average $R^2$ | 0.20 | | 0.20 | | 0.21 | | 0.21 | | 0.20 | |
| Number of periods | 45 | | 45 | | 45 | | 45 | | 42 | |

Panel B. First Subperiod 1989–1996

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | |
| constant | 0.52682 | (0.00) | 0.56141 | (0.00) | 0.56600 | (0.00) | 0.55897 | (0.00) | 0.59299 | (0.00 |
| ln(Equity Value) | -0.02176 | (0.00) | -0.02352 | (0.01) | -0.02358 | (0.00) | -0.02322 | (0.00) | -0.02398 | (0.00 |
| BK/MKT | -0.00110 | (0.98) | -0.00325 | (0.94) | -0.00512 | (0.91) | -0.00362 | (0.94) | -0.03043 | (0.54 |
| $r_{i,t-12,t}$ | 0.02150 | (0.46) | 0.01753 | (0.54) | 0.01583 | (0.60) | 0.01665 | (0.57) | 0.02411 | (0.39 |
| Quarterly turnover | 0.04379 | (0.51) | 0.06859 | (0.32) | 0.07649 | (0.21) | 0.07432 | (0.24) | -0.02120 | (0.69 |
| CHS:ΔBREADTH (quarterly) | 0.11836 | (0.42) | | | | | | | | |
| ΔNo Financial Owners (quarterly) | | | 0.00055 | (0.61) | | | | | | |
| ΔNo Owners ≥ 100 Shares (quarterly) | | | | | -0.00006 | (0.13) | | | | |
| ΔNo Individual Owners ≥ 100 Shares (quarterly) | | | | | | | -0.00005 | (0.22) | | |
| ΔHerfindahl Index (quarterly) | | | | | | | | | -0.37111 | (0.31 |
| average $R^2$ | 0.23 | | 0.23 | | 0.23 | | 0.23 | | 0.22 | |
| Number of periods | 19 | | 19 | | 19 | | 19 | | 16 | |

Panel C. Second Subperiod 1997–2003

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | | $r_{i,t+q}$ | |
| constant | 0.37066 | (0.01) | 0.36115 | (0.01) | 0.33396 | (0.03) | 0.34031 | (0.03) | 0.34892 | (0.02 |
| ln(Equity Value) | -0.01587 | (0.02) | -0.01528 | (0.02) | -0.01401 | (0.05) | -0.01429 | (0.04) | -0.01472 | (0.03 |
| BK/MKT | -0.03845 | (0.02) | -0.03936 | (0.02) | -0.03895 | (0.02) | -0.03998 | (0.02) | -0.03693 | (0.03 |
| $r_{i,t-12,t}$ | 0.00007 | (1.00) | 0.00235 | (0.96) | 0.00598 | (0.89) | 0.00616 | (0.89) | 0.00464 | (0.92 |
| Quarterly turnover | -0.00663 | (0.90) | -0.02422 | (0.66) | -0.00728 | (0.90) | -0.00973 | (0.86) | -0.02522 | (0.65 |
| CHS:ΔBREADTH (quarterly) | 0.09018 | (0.40) | | | | | | | | |
| ΔNo Financial Owners (quarterly) | | | 0.00012 | (0.76) | | | | | | |
| ΔNo Owners ≥ 100 Shares (quarterly) | | | | | -0.00001 | (0.59) | | | | |
| ΔNo Individual Owners ≥ 100 Shares (quarterly) | | | | | | | -0.00001 | (0.62) | | |
| ΔHerfindahl Index (quarterly) | | | | | | | | | -0.14070 | (0.52 |
| average $R^2$ | 0.18 | | 0.19 | | 0.20 | | 0.20 | | 0.19 | |
| Number of periods | 26 | | 26 | | 26 | | 26 | | 26 | |

The table summarizes results from Fama and MacBeth style regressions with stock return as the dependent variable. Crossectional regressions are performed on each date. The estimates reported are time series averages of these regression coefficients. The numbers in parenthesis are p-values for the hypothesis that the coefficient is equal to zero. Explanatory variables: *Mutual Fund Holdings:* fraction of the company owned by mutual funds, *Equity Value:* market value of the firm's equity, $r_{i,t-12,t}$*:* stock return for the previous year, *Quarterly turnover:* stock turnover measured as the fraction of the company's equity traded during a quarter, *BK/MKT:* Book to Market ratio, *E/P:* latest ratio of earnings to price, *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.

**Table 7** Monthly returns for portfolios sorted on various breadth measures

Panel A. Whole Period 1989–2003

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | 0.78 | 1.29 | 1.04 | 1.36 | 1.98 |
| P2 | 1.32 | 1.29 | 1.43 | 1.56 | 1.83 |
| P3 | 1.20 | 1.84 | 1.79 | 1.43 | 1.20 |
| P4 | 1.18 | 1.72 | 1.71 | 1.91 | 1.35 |
| P5 | 1.49 | 2.36 | 1.64 | 1.89 | 1.69 |
| P6 | 1.33 | 1.89 | 2.26 | 2.42 | 1.86 |
| P7 | 0.73 | 1.83 | 2.23 | 1.88 | 1.99 |
| P8 | 1.31 | 1.89 | 1.91 | 1.64 | 1.82 |
| P9 | 1.13 | 1.77 | 2.03 | 2.14 | 2.16 |
| P10 (high) | 1.49 | 1.71 | 1.65 | 1.43 | 1.23 |
| P1-P10 | -0.708 | -0.422 | -0.606 | -0.067 | 0.754 |
| pvalue | [0.14] | [0.32] | [0.25] | [0.90] | [0.14] |

Panel B. First Subperiod 1989–1996

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | 1.40 | 3.04 | 2.26 | 2.87 | 3.11 |
| P2 | 2.27 | 2.69 | 2.57 | 2.77 | 3.41 |
| P3 | 1.43 | 2.42 | 2.76 | 2.55 | 2.78 |
| P4 | 1.30 | 3.43 | 3.39 | 2.83 | 2.48 |
| P5 | 1.53 | 4.29 | 3.03 | 3.44 | 3.25 |
| P6 | 1.44 | 3.63 | 3.45 | 4.26 | 3.12 |
| P7 | 0.68 | 3.52 | 4.51 | 4.25 | 2.57 |
| P8 | 1.44 | 2.77 | 3.40 | 2.49 | 3.36 |
| P9 | 1.19 | 2.41 | 3.10 | 2.95 | 3.67 |
| P10 (high) | 1.55 | 3.03 | 2.86 | 2.67 | 3.33 |
| P1-P10 | -0.148 | 0.009 | -0.603 | 0.201 | -0.220 |
| pvalue | [0.83] | [0.99] | [0.51] | [0.83] | [0.78] |

Panel C. Second Subperiod 1997–2003

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | 0.12 | 0.19 | 0.27 | 0.40 | 1.31 |
| P2 | 0.32 | 0.39 | 0.72 | 0.79 | 0.90 |
| P3 | 0.95 | 1.48 | 1.17 | 0.72 | 0.26 |
| P4 | 1.06 | 0.63 | 0.65 | 1.33 | 0.67 |
| P5 | 1.45 | 1.15 | 0.76 | 0.90 | 0.77 |
| P6 | 1.23 | 0.79 | 1.50 | 1.25 | 1.11 |
| P7 | 0.77 | 0.76 | 0.78 | 0.37 | 1.64 |
| P8 | 1.17 | 1.33 | 0.97 | 1.10 | 0.91 |
| P9 | 1.06 | 1.35 | 1.35 | 1.63 | 1.26 |
| P10 (high) | 1.42 | 0.88 | 0.87 | 0.64 | -0.02 |
| P1-P10 | -1.296 | -0.694 | -0.607 | -0.237 | 1.334 |
| pvalue | [0.04] | [0.20] | [0.33] | [0.69] | [0.05] |

The table summarizes the returns for 10 portfolios sorted on the breadth measure specified at the top of each column. Returns are measured as percentage monthly return (not annualized). Each portfolio is constructed by measuring the change in the breadth measure over a period, sorting the available stocks into portfolios using this measure, and then calculating the average return over the following period. The portfolios are equally weighted. The last two rows report the result of a test of difference of means of the two extreme portfolios. The row marked *P1-P10* reports the difference in means, the last row shows the p-value (in square brackets) of the null hypothesis that this difference is equal to zero. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.

**Table 8** Monthly residuals from the Fama French three factor model for portfolios sorted on various breadth measures

Panel A. Whole Period 1989–2003

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | -1.50 | -1.57 | -1.79 | -1.43 | -1.35 |
| P2 | -0.83 | -1.44 | -1.21 | -1.25 | -0.62 |
| P3 | -0.84 | -0.72 | -1.36 | -1.33 | -1.05 |
| P4 | -0.47 | -0.66 | -0.75 | -0.65 | -1.00 |
| P5 | -0.33 | -0.00 | -0.27 | -0.13 | -0.39 |
| P6 | -0.19 | -0.41 | 0.26 | 0.35 | -0.27 |
| P7 | -0.83 | -0.37 | 0.15 | -0.30 | -0.56 |
| P8 | -0.93 | -0.78 | -0.85 | -0.83 | -1.29 |
| P9 | -1.17 | -0.99 | -0.91 | -1.11 | -0.52 |
| P10 (high) | -1.06 | -1.37 | -1.43 | -1.50 | -1.47 |
| P1-P10 | -0.446 | -0.204 | -0.368 | 0.067 | 0.119 |
| pvalue | [0.34] | [0.66] | [0.48] | [0.90] | [0.80] |

Panel B. First Subperiod 1989–1996

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | -0.95 | -1.06 | -1.68 | -1.36 | -1.65 |
| P2 | -0.05 | -1.33 | -0.92 | -0.76 | -0.32 |
| P3 | -0.84 | -1.19 | -1.56 | -1.28 | -0.55 |
| P4 | -0.74 | -0.36 | -0.18 | -0.89 | -0.87 |
| P5 | -0.73 | 0.50 | 0.05 | 0.11 | -0.10 |
| P6 | -0.38 | -0.17 | 0.16 | 0.62 | -0.35 |
| P7 | -0.91 | 0.01 | 0.79 | 0.76 | -0.89 |
| P8 | -0.93 | -0.26 | -0.41 | -0.90 | -0.89 |
| P9 | -1.35 | -1.34 | -0.83 | -1.28 | -0.23 |
| P10 (high) | -1.14 | -1.07 | -1.53 | -1.20 | -0.90 |
| P1-P10 | 0.194 | 0.010 | -0.147 | -0.163 | -0.751 |
| pvalue | [0.78] | [0.99] | [0.87] | [0.87] | [0.36] |

Panel C. Second Subperiod 1997–2003

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | -2.09 | -1.89 | -1.87 | -1.47 | -1.17 |
| P2 | -1.64 | -1.51 | -1.39 | -1.56 | -0.80 |
| P3 | -0.84 | -0.43 | -1.24 | -1.37 | -1.35 |
| P4 | -0.18 | -0.85 | -1.11 | -0.50 | -1.08 |
| P5 | 0.10 | -0.32 | -0.48 | -0.28 | -0.57 |
| P6 | 0.01 | -0.56 | 0.32 | 0.18 | -0.23 |
| P7 | -0.74 | -0.62 | -0.26 | -0.97 | -0.36 |
| P8 | -0.92 | -1.12 | -1.13 | -0.80 | -1.53 |
| P9 | -0.97 | -0.77 | -0.96 | -1.00 | -0.69 |
| P10 (high) | -0.97 | -1.55 | -1.36 | -1.68 | -1.81 |
| P1-P10 | -1.119 | -0.339 | -0.508 | 0.212 | 0.637 |
| pvalue | [0.08] | [0.56] | [0.42] | [0.72] | [0.26] |

The table summarizes returns in excess of the Fama French three factor model for 10 portfolios sorted on the breadth measure specified at the top. Each portfolio is constructed by measuring the change in the breadth measure over a period, sorting the available stocks into portfolios using this measure, and then calculating the average return over the following period. Returns are measured as percentage monthly returns (not annualized). The portfolios are equally weighted. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.

**Table 9** Fama Macbeth style regression of determinants of next month returns

Panel A. Whole Period 1989–2003

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | |
| constant | 0.14505 | (0.00) | 0.14924 | (0.00) | 0.14348 | (0.00) | 0.14284 | (0.00) | 0.13194 | (0.00) |
| ln(Equity Value) | -0.00584 | (0.00) | -0.00600 | (0.00) | -0.00573 | (0.00) | -0.00569 | (0.00) | -0.00509 | (0.00) |
| BK/MKT | -0.01570 | (0.00) | -0.01592 | (0.00) | -0.01550 | (0.00) | -0.01551 | (0.00) | -0.01739 | (0.00) |
| $r_{i,t-12,t}$ | -0.00231 | (0.70) | -0.00210 | (0.72) | -0.00151 | (0.79) | -0.00142 | (0.81) | -0.00200 | (0.73) |
| Monthly turnover | -0.00684 | (0.85) | -0.02363 | (0.54) | -0.02487 | (0.51) | -0.02455 | (0.52) | -0.02133 | (0.58) |
| CHS:ΔBREADTH | 0.01862 | (0.76) | | | | | | | | |
| Δ No Financial Owners | | | 0.00021 | (0.42) | | | | | | |
| Δ No Owners | | | | | 0.00001 | (0.32) | | | | |
| Δ No Individual Owners | | | | | | | 0.00000 | (0.96) | | |
| Δ Herfindahl Index | | | | | | | | | -0.02179 | (0.92) |
| average $R^2$ | 0.16 | | 0.16 | | 0.16 | | 0.16 | | 0.17 | |
| Number of periods | 129 | | 129 | | 129 | | 129 | | 126 | |

Panel B. First Subperiod 1989–1996

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | |
| constant | 0.20221 | (0.00) | 0.20977 | (0.00) | 0.19814 | (0.00) | 0.19868 | (0.00) | 0.18482 | (0.00) |
| ln(Equity Value) | -0.00804 | (0.00) | -0.00840 | (0.00) | -0.00785 | (0.00) | -0.00786 | (0.00) | -0.00698 | (0.00) |
| BK/MKT | -0.01586 | (0.11) | -0.01517 | (0.12) | -0.01468 | (0.13) | -0.01482 | (0.13) | -0.02007 | (0.05) |
| $r_{i,t-12,t}$ | 0.00660 | (0.25) | 0.00773 | (0.18) | 0.00702 | (0.22) | 0.00694 | (0.23) | 0.00569 | (0.30) |
| Monthly turnover | 0.05872 | (0.20) | 0.04375 | (0.36) | 0.05192 | (0.25) | 0.05339 | (0.25) | 0.06365 | (0.12) |
| CHS:ΔBREADTH | -0.06541 | (0.41) | | | | | | | | |
| Δ No Financial Owners | | | 0.00059 | (0.23) | | | | | | |
| Δ No Owners | | | | | 0.00001 | (0.68) | | | | |
| Δ No Individual Owners | | | | | | | -0.00002 | (0.45) | | |
| Δ Herfindahl Index | | | | | | | | | 0.08252 | (0.86) |
| average $R^2$ | 0.18 | | 0.18 | | 0.18 | | 0.18 | | 0.19 | |
| Number of periods | 51 | | 51 | | 51 | | 51 | | 48 | |

Second Subperiod 1997–2003

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | | $r_{i,t+1}$ | |
| constant | 0.10767 | (0.00) | 0.10967 | (0.00) | 0.10775 | (0.00) | 0.10634 | (0.00) | 0.09940 | (0.01) |
| ln(Equity Value) | -0.00440 | (0.01) | -0.00443 | (0.01) | -0.00434 | (0.01) | -0.00427 | (0.01) | -0.00393 | (0.02) |
| BK/MKT | -0.01560 | (0.00) | -0.01641 | (0.00) | -0.01603 | (0.00) | -0.01596 | (0.00) | -0.01575 | (0.00) |
| $r_{i,t-12,t}$ | -0.00814 | (0.37) | -0.00852 | (0.34) | -0.00708 | (0.42) | -0.00690 | (0.43) | -0.00673 | (0.44) |
| Monthly turnover | -0.04971 | (0.35) | -0.06768 | (0.23) | -0.07507 | (0.16) | -0.07552 | (0.16) | -0.07363 | (0.19) |
| CHS:ΔBREADTH | 0.07356 | (0.39) | | | | | | | | |
| Δ No Financial Owners | | | -0.00004 | (0.89) | | | | | | |
| Δ No Owners | | | | | 0.00002 | (0.26) | | | | |
| Δ No Individual Owners | | | | | | | 0.00002 | (0.27) | | |
| Δ Herfindahl Index | | | | | | | | | -0.08597 | (0.65) |
| average $R^2$ | 0.15 | | 0.15 | | 0.16 | | 0.16 | | 0.15 | |
| Number of periods | 78 | | 78 | | 78 | | 78 | | 78 | |

The table summarizes results from Fama and MacBeth style regressions with stock return as the dependent variable. Crossectional regressions are performed on each date. The estimates reported are time series averages of these regression coefficients. The numbers in parenthesis are p-values for the hypothesis that the coefficient is equal to zero. Explanatory variables: *Mutual Fund Holdings:* fraction of the company owned by mutual funds, *Equity Value:* market value of the firm's equity, $r_{i,t-12,t}$*:* stock return for the previous year, *Monthly turnover:* stock turnover measured as the fraction of the company's equity traded during a month, *BK/MKT:* Book to Market ratio, *E/P:* latest ratio of earnings to price, *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.

**Table 10** (Contemporaneous) monthly returns on portfolios sorted on various breadth measures

Whole Period 1989–2003

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | 0.68 | 2.60 | 3.96 | 3.85 | 3.49 |
| P2 | 0.69 | 0.92 | 1.71 | 1.98 | 2.01 |
| P3 | 0.63 | 1.28 | 1.93 | 1.66 | 2.08 |
| P4 | 0.36 | 0.82 | 1.29 | 1.69 | 1.07 |
| P5 | 0.98 | 1.36 | 0.84 | 0.81 | 1.21 |
| P6 | 0.54 | 1.26 | 0.81 | 0.67 | 0.76 |
| P7 | 1.32 | 1.33 | 1.16 | 1.25 | 0.80 |
| P8 | 1.79 | 2.28 | 1.86 | 1.70 | 1.09 |
| P9 | 1.73 | 2.60 | 2.17 | 2.06 | 1.76 |
| P10 (high) | 3.17 | 2.77 | 1.39 | 1.48 | 2.95 |
| P1-P10 | -2.483 | -0.168 | 2.573 | 2.373 | 0.535 |
| pvalue | [0.00] | [0.80] | [0.00] | [0.00] | [0.38] |

First Subperiod 1989–19961

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | 1.37 | 4.03 | 3.71 | 3.66 | 6.19 |
| P2 | 1.26 | 2.11 | 2.49 | 3.02 | 4.04 |
| P3 | 0.49 | 2.25 | 3.24 | 2.51 | 3.39 |
| P4 | 0.43 | 2.43 | 2.21 | 3.17 | 2.41 |
| P5 | 1.34 | 2.60 | 1.44 | 1.87 | 3.14 |
| P6 | 1.05 | 2.55 | 2.18 | 1.50 | 2.18 |
| P7 | 2.03 | 2.74 | 3.54 | 3.38 | 1.70 |
| P8 | 1.83 | 3.55 | 3.79 | 3.45 | 2.11 |
| P9 | 2.06 | 4.17 | 3.96 | 4.05 | 2.46 |
| P10 (high) | 3.11 | 4.48 | 4.42 | 4.50 | 3.93 |
| P1-P10 | -1.738 | -0.456 | -0.717 | -0.843 | 2.260 |
| pvalue | [0.02] | [0.67] | [0.53] | [0.46] | [0.03] |

Second Subperiod 1997–2003

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | -0.05 | 1.67 | 4.13 | 3.98 | 1.82 |
| P2 | 0.08 | 0.13 | 1.20 | 1.30 | 0.77 |
| P3 | 0.78 | 0.64 | 1.08 | 1.10 | 1.27 |
| P4 | 0.28 | -0.24 | 0.69 | 0.72 | 0.25 |
| P5 | 0.59 | 0.54 | 0.45 | 0.12 | 0.03 |
| P6 | -0.01 | 0.42 | -0.08 | 0.12 | -0.12 |
| P7 | 0.55 | 0.40 | -0.40 | -0.15 | 0.24 |
| P8 | 1.75 | 1.44 | 0.59 | 0.56 | 0.47 |
| P9 | 1.37 | 1.58 | 1.00 | 0.76 | 1.32 |
| P10 (high) | 3.23 | 1.65 | -0.60 | -0.50 | 2.35 |
| P1-P10 | -3.285 | 0.021 | 4.724 | 4.476 | -0.526 |
| pvalue | [0.00] | [0.98] | [0.00] | [0.00] | [0.48] |

The table summarizes the returns for 10 portfolios sorted on the breadth measure specified at the top of each column. Returns are measured as percentage monthly return (not annualized). Each portfolio is constructed by measuring the change in the breadth measure over the month, sorting the available stocks into portfolios using this measure, and then calculating the average return over the same month. The portfolios are equally weighted. The last two rows report the result of a test of difference of means of the two extreme portfolios. The row marked *P1-P10* reports the difference in means, the last row shows the p-value (in square brackets) of the null hypothesis that this difference is equal to zero. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.

**Table 11** (Contemporaneous) residuals from a Fama French three factor model for portfolios sorted on various breadth measures

Whole Period 1989–2003

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | -1.45 | -0.20 | 1.02 | 1.02 | -0.06 |
| P2 | -1.55 | -1.57 | -1.02 | -0.93 | -0.84 |
| P3 | -1.38 | -1.17 | -1.05 | -1.15 | -0.94 |
| P4 | -1.00 | -1.18 | -1.12 | -0.78 | -1.15 |
| P5 | -0.53 | -0.65 | -1.14 | -1.06 | -0.69 |
| P6 | -1.15 | -1.13 | -0.71 | -1.01 | -1.03 |
| P7 | -0.48 | -0.94 | -0.73 | -0.79 | -1.44 |
| P8 | -0.21 | -0.63 | -0.81 | -0.82 | -1.42 |
| P9 | -0.87 | -0.17 | -0.93 | -0.83 | -0.97 |
| P10 (high) | 0.29 | -0.54 | -1.83 | -1.82 | 0.25 |
| P1-P10 | -1.746 | 0.341 | 2.848 | 2.841 | -0.305 |
| pvalue | [0.00] | [0.50] | [0.00] | [0.00] | [0.57] |

First Subperiod 1989–1996

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | -1.01 | 0.10 | 0.09 | 0.09 | 1.32 |
| P2 | -1.38 | -1.45 | -1.49 | -0.90 | 0.05 |
| P3 | -1.76 | -1.28 | -0.86 | -1.47 | -0.82 |
| P4 | -1.25 | -1.01 | -1.48 | -0.79 | -0.89 |
| P5 | -0.62 | -0.73 | -1.98 | -1.20 | -0.28 |
| P6 | -1.03 | -1.34 | -0.50 | -1.44 | -0.93 |
| P7 | -0.27 | -0.96 | 0.03 | -0.25 | -1.77 |
| P8 | -0.20 | -0.37 | -0.03 | -0.26 | -1.44 |
| P9 | -0.86 | 0.47 | -0.02 | 0.25 | -1.47 |
| P10 (high) | 0.22 | 0.27 | -0.17 | -0.21 | -0.35 |
| P1-P10 | -1.227 | -0.172 | 0.258 | 0.301 | 1.664 |
| pvalue | [0.10] | [0.86] | [0.81] | [0.78] | [0.08] |

Second Subperiod 1997–2003

| | CHS:ΔBREADTH | ΔNo Financial Owners | ΔNo Owners ≥ 100 Shares | ΔNo Individual Owners ≥ 100 Shares | ΔHerfindahl Index |
|---|---|---|---|---|---|
| P1 (low) | -1.93 | -0.39 | 1.63 | 1.63 | -0.91 |
| P2 | -1.75 | -1.65 | -0.72 | -0.95 | -1.39 |
| P3 | -0.98 | -1.09 | -1.17 | -0.95 | -1.01 |
| P4 | -0.73 | -1.29 | -0.88 | -0.77 | -1.32 |
| P5 | -0.44 | -0.60 | -0.58 | -0.96 | -0.94 |
| P6 | -1.27 | -0.99 | -0.85 | -0.74 | -1.10 |
| P7 | -0.71 | -0.93 | -1.22 | -1.14 | -1.24 |
| P8 | -0.24 | -0.80 | -1.32 | -1.18 | -1.41 |
| P9 | -0.88 | -0.59 | -1.53 | -1.54 | -0.66 |
| P10 (high) | 0.37 | -1.07 | -2.91 | -2.87 | 0.61 |
| P1-P10 | -2.304 | 0.676 | 4.541 | 4.502 | -1.517 |
| pvalue | [0.00] | [0.23] | [0.00] | [0.00] | [0.01] |

The table summarizes returns in excess of the Fama French three factor model for 10 portfolios sorted on the breadth measure specified at the top. Each portfolio is constructed by measuring the change in the breadth measure over the month, sorting the available stocks into portfolios using this measure, and then calculating the average return over the same month. Returns are measured as percentage monthly returns (not annualized). The portfolios are equally weighted. *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.

**Table 12** Fama Macbeth style regression of determinants of contemporaneous monthly returns

Whole Period 1989–2003

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | |
| constant | -0.00536 | (0.82) | 0.00086 | (0.97) | 0.00240 | (0.92) | 0.00628 | (0.79) | -0.00594 | (0.80) |
| ln(Equity Value) | 0.00027 | (0.81) | -0.00001 | (0.99) | -0.00014 | (0.90) | -0.00035 | (0.76) | 0.00022 | (0.85) |
| BK/MKT | 0.00264 | (0.59) | 0.00188 | (0.70) | 0.00258 | (0.60) | 0.00277 | (0.57) | 0.00308 | (0.53) |
| $r_{i,t-12,t}$ | 0.05494 | (0.00) | 0.05684 | (0.00) | 0.05416 | (0.00) | 0.05363 | (0.00) | 0.05488 | (0.00) |
| Monthly turnover | 0.15634 | (0.00) | 0.15599 | (0.00) | 0.17172 | (0.00) | 0.17185 | (0.00) | 0.16338 | (0.00) |
| CHS:ΔBREADTH | 0.10800 | (0.05) | | | | | | | | |
| Δ No Financial Owners | | | -0.00074 | (0.02) | | | | | | |
| Δ No Owners | | | | | -0.00009 | (0.00) | | | | |
| Δ No Individual Owners | | | | | | | -0.00010 | (0.00) | | |
| Δ Herfindahl Index | | | | | | | | | 0.48239 | (0.03) |
| average $R^2$ | 0.24 | | 0.24 | | 0.25 | | 0.25 | | 0.25 | |
| Number of periods | 129 | | 129 | | 129 | | 129 | | 126 | |

First Subperiod 1989–1996

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | |
| constant | -0.01094 | (0.77) | 0.00764 | (0.84) | 0.01000 | (0.79) | 0.02006 | (0.61) | -0.01646 | (0.66) |
| ln(Equity Value) | 0.00072 | (0.70) | -0.00017 | (0.93) | -0.00035 | (0.85) | -0.00085 | (0.65) | 0.00078 | (0.67) |
| BK/MKT | 0.00283 | (0.79) | 0.00178 | (0.86) | 0.00282 | (0.79) | 0.00282 | (0.79) | 0.00488 | (0.64) |
| $r_{i,t-12,t}$ | 0.03935 | (0.00) | 0.04087 | (0.00) | 0.03914 | (0.00) | 0.03907 | (0.00) | 0.03863 | (0.00) |
| Monthly turnover | 0.29347 | (0.00) | 0.29807 | (0.00) | 0.29508 | (0.00) | 0.29137 | (0.00) | 0.32385 | (0.00) |
| CHS:ΔBREADTH | 0.14423 | (0.04) | | | | | | | | |
| Δ No Financial Owners | | | -0.00016 | (0.79) | | | | | | |
| Δ No Owners | | | | | -0.00009 | (0.00) | | | | |
| Δ No Individual Owners | | | | | | | -0.00011 | (0.00) | | |
| Δ Herfindahl Index | | | | | | | | | 0.51992 | (0.27) |
| average $R^2$ | 0.27 | | 0.27 | | 0.27 | | 0.27 | | 0.28 | |
| Number of periods | 51 | | 51 | | 51 | | 51 | | 48 | |

Second Subperiod 1997–2003

| | Determinants of: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | | $r_{i,t}$ | |
| constant | -0.00171 | (0.96) | -0.00358 | (0.91) | -0.00258 | (0.93) | -0.00273 | (0.93) | 0.00054 | (0.99) |
| ln(Equity Value) | -0.00002 | (0.99) | 0.00010 | (0.94) | -0.00001 | (1.00) | -0.00002 | (0.99) | -0.00012 | (0.93) |
| BK/MKT | 0.00251 | (0.56) | 0.00194 | (0.66) | 0.00242 | (0.58) | 0.00274 | (0.53) | 0.00197 | (0.66) |
| $r_{i,t-12,t}$ | 0.06513 | (0.00) | 0.06728 | (0.00) | 0.06398 | (0.00) | 0.06316 | (0.00) | 0.06489 | (0.00) |
| Monthly turnover | 0.06668 | (0.18) | 0.06310 | (0.23) | 0.09107 | (0.08) | 0.09370 | (0.07) | 0.06462 | (0.23) |
| CHS:ΔBREADTH | 0.08431 | (0.28) | | | | | | | | |
| Δ No Financial Owners | | | -0.00111 | (0.00) | | | | | | |
| Δ No Owners | | | | | -0.00009 | (0.00) | | | | |
| Δ No Individual Owners | | | | | | | -0.00010 | (0.00) | | |
| Δ Herfindahl Index | | | | | | | | | 0.45930 | (0.02) |
| average $R^2$ | 0.22 | | 0.22 | | 0.24 | | 0.24 | | 0.22 | |
| Number of periods | 78 | | 78 | | 78 | | 78 | | 78 | |

The table summarizes results from Fama and MacBeth style regressions with stock return as the dependent variable. Crossectional regressions are performed on each date. The estimates reported are time series averages of these regression coefficients. The numbers in parenthesis are p-values for the hypothesis that the coefficient is equal to zero. Explanatory variables: *Mutual Fund Holdings:* fraction of the company owned by mutual funds, *Equity Value:* market value of the firm's equity, $r_{i,t-12,t}$*:* stock return for the previous year, *Monthly turnover:* stock turnover measured as the fraction of the company's equity traded during a month, *BK/MKT:* Book to Market ratio, *E/P:* latest ratio of earnings to price, *CHS:BREADTH:* Chen et al. (2002) definition of breadth where the number of mutual fonds long in a stock is divided by the total number of mutual funds active in the relevant period, *No Financial Owners:* number of financial owners long in a stock, *No Owners:* number of owners long in a stock with a holding of 100 shares or more, *No Individual Owners:* number of individual (private) owners long in a stock with a holding greater than 100 shares and *Herfindahl Index:* concentration index, calculated as the squared sum of ownership fractions for all owners. The symbol Δ signifies changes from one period to the next.