DOES PRIVATE INFORMATION ENGENDER SUPERIOR PERFORMANCE: A STUDY OF ACTIVELY MANAGED EQUITY FUNDS

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Abstract

This paper studies the link between the performance of actively managed equity mutual funds and the degree of private information (DPI) of their holding stocks. In order to determine the funds' DPI, we use an improved measure of "Firm-Specific Return Variation". Consistent with rational expectations equilibrium models, we find that actively managed mutual equity funds earn, collectively, just enough abnormal returns to justify expenses. At the total net asset level, we find that the fund performance net of expenses is insignificantly related to the fund DPI. At the portfolio holding stocks' level, we find that equity funds with higher DPI hold common stocks with higher alphas. This result is driven by narrowly-defined equity funds, such as "aggressive growth" and "small-cap" equity funds. Our results are robust to performance-model specifications, and are not engendered by effects pertaining to other traditional performance determinants such as size, expenses, or turnover.

Key-words: private information, specific risk, active management, equity funds, selectivity performance, market timing performance, rational expectations equilibrium

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Introduction

Academics and practitioners have a considerable interest for the question if actively managed mutual funds have stock picking talents. The literature provides conflicting answers to this important topic. Traditional studies performed at the TNA level show a pessimistic panorama, in the sense that mutual fund managers are not able to earn superior performance (even before expenses). More recent studies performed at the portfolio's holding stocks level show that mutual fund managers have, in reality, stock picking talents justifying expenses. The unenthusiastic results obtained by traditional studies seem to be related to other market imperfections, such as the liquidity services provided by fund managers (Edelen, 1999).

Consistent with rational expectations equilibrium (REE) models initiated by Grossman (1976) and Grossman & Stiglitz (1981), the general conclusion of the empirical literature seems to be that mutual fund managers, as a group, earn just enough abnormal returns to offset expenses. This finding does not elude the possibility of specific groups of funds being able to create additional value, net of expenses, for their clients. In order to see if select groups of funds are able to overperform the market, the existing literature proposes various performance determinants such as size, turnover or expenses. Neither of these variables has been found to clearly distinguish mutual funds with superior selectivity performance. The question if select groups of mutual funds are able to create positive net value for their clients remains opened.

Our paper tackles this important research question at its starting point. We take the view that the main component of active mutual fund management resides in obtaining, and efficiently using, *private information*. Private information is expected to be the main fund performance driver. Active portfolio management makes little sense if fund managers do not consider assets, or market segments, with high "degrees of private information", hereafter "DPI". The managers' expertise is more effective with such securities, and this expertise allows them to better assess the future value of the portfolio's holding assets. Managers being able to acquire and effectively use private information are expected to take better investment decisions in order to boost portfolio performance. Following this line of thought, the DPI inherent to the assets held by the fund is expected to be a relevant variable for distinguishing funds with higher performance from others.

The hypothesis that we wish to test is that private information engenders superior portfolio performance. For this purpose, we analyse the link between the performance of actively managed portfolios and the extent to which they hold assets with high amounts of private information. We justify our approach by two arguments pertaining to REE models with privately informed investors[2]. First, these models predict that portfolios held by informed investors are more concentrated in assets they know better, which are obviously assets with high DPI. Consequently, portfolios held by informed investors exhibit higher DPI. Second, these portfolios exhibit higher performance than the market portfolio. Informed investors possess private information that is not perfectly aggregated by prices and this information boosts their portfolios' performance. Summing up these two arguments, we expect a positive link between the DPI of actively managed portfolios' and their own performance. Our paper exploits this important conclusion of REE models in order to distinguish mutual funds with superior stock-picking capacities from others.

A simple model with one risky asset like the one proposed by Grossman & Stiglitz (1981) is sufficient to support our line of thought. This model shows that, because of their informational advantage, informed investors have a higher ownership in the risky security and earn higher expected returns than the uninformed ones. The model establishes a positive link between the return on the risky asset and the asset's DPI. The intensity of this link depends on other parameters such as the investors' risk aversion, noise, or the asset's residual uncertainty. Some authors have generalized the model of Grossman & Stiglitz (1980) in a setting with many risky assets. This setting is more adapted for our research issue. In most cases, multi-asset REE models predict that investors prefer securities they know better than others, and obtain superior performance wit such securities. Investors favour nearby investments (Coval & Moskowitz, 1999) and securities from their own country (Gehrig, 1993; Brennan & Cao, 1997). For example, Coval and Moskowitz (1999) show that mutual fund managers have a preference for nearby investments and are able to select undervalued securities in local holdings. This finding is more pronounced for small funds, with concentrated holdings in small, less-known cities.

[2] REE models with privately informed investors have received strong support from recent empirical studies performed at the asset pricing level (Easley *et al.*, 2002) or at the portfolio management level (Biais *et al.*, 2003). Moreover, empirical studies performed on mutual funds corroborate the main conclusions of REE models. Studies performed at the portfolio holdings level show that common stocks detained by equity mutual funds exhibit alphas that correspond approximately to information acquisition costs (Wermers, 2000). Studies performed at the total net assets (TNA) level show that mutual funds exhibit alphas net of expenses that correspond to the costs attributed to the liquidity service provided by fund managers (Edelen, 1999).

The main contribution of this paper is to analyse the link between DPI and performance for actively managed equity mutual funds. *Are securities with high amounts of private information an opportunity for fund managers to earn substantial profits?* Existing studies have not yet considered this issue explicitly, but rather implicitly, by considering performance determinants such as size, turnover or expenses. The results obtained by these studies are inconclusive, undoubtedly because these variables are poor proxies of funds' DPI. We determine funds' DPI in a direct and accurate manner, i.e. at the fund holdings' level, by aggregating their holding stocks' DPI. Then, we study the impact of DPI on fund performance and management characteristics. Our objective is to see if managers are better able to select undervalued common stocks when the latter are affected by high informational asymmetries.

An important step for gauging funds' DPI is determining the DPI of their common stock holdings. Our second main contribution resides in improving a traditional measure of private information called "firm-specific return variation" (FSRV), and in using it for calculating funds' DPI. Two reasons make FSRV relevant for our research objective. First, a large and recent empirical literature shows that FSRV has a solid conceptual ground and provides convincing results as a proxy for private information. Second, this measure is available, and easy to calculate, for most fund holding stocks.

Our empirical investigations show that the traditional FSRV is, nevertheless, insufficient. More precisely, this measure is not significantly related to stock returns, and thus seems unable to capture the information risk-premium. We find that this deceiving result is driven by FSRV controlling stock return variations exclusively for market and industry-level effects. We take a step further and control stock return variation for two additional factors of risk: the size and the "book-to-market" (hereafter BM). These factors have proven important for explaining stock returns in past empirical studies. After controlling these factors, the FSRV measure appears to exhibit a high power to capture the information risk-premium.

Based on the traditional FSRV measure, which controls uniquely for market and industry-wide effects, and our improved measure that controls for additional factors of risk, we construct two measures of stocks' DPI. They are denoted by DPI_1 and DPI_2, respectively. In order to test the power of these measures to capture private information effects, we use an important result pertaining to rational expectations model with privately informed investors: since investors require an information-risk premium, they expect higher stock returns for stocks with higher DPI. Our empirical results show that DPI_2 provides superior results relative to DPI_1. Consistent with the theory, we observe a strong relationship between stock returns and our improved DPI_2 measure. This relation is not significant with the DPI_1 measure. By adding *the size and BM* variables in the cross-sectional regressions involving DPI_1, this measure exhibits a strong positive relation with stock returns. The power of DPI_1 to capture private information measure is thus obscured by the influence of common factors of returns that are not controlled for. Moreover, DPI_2 is better able to discriminate between mutual funds with respect to their performance and management characteristics. For example, equity mutual funds with narrower investment objectives exhibit higher DPI than mutual funds that are widely defined, contrary to the DPI_1 measure. With the latter measure, more narrowly-defined funds, especially “Small Capital Growth” funds exhibit, paradoxically, the lowest level of private information. This result is driven by the strong influence of size and BM effects on the traditional FSRV measure. Moreover, funds’ expenses and turnover, which are known to be higher for mutual funds with higher levels of active management, are positively and significantly related to DPI_2. The relation between DPI_1 and expenses and turnover are not significant.

By using DPI_2 for determining the amount of private embedded in mutual fund holdings, we find a strong support for REE models with privately informed investors. When we measure the fund performance at the TNA level, i.e. net of information acquisition costs, we find a *non-significant* relation between fund performance and their DPI. By measuring the fund performance at the portfolio holdings’ level, i.e. before information acquisition costs, we find a positive and significant relation between fund performance and DPI. Interestingly, this relation is driven uniquely by narrowly defined equity mutual funds, such as “Aggressive”, “MidCap” and “SmallCap” growth funds. We do not find such a significant relation for widely defined funds, such as “Growth”, “Growth and Income” or “Income and Growth” funds. These results are robust to several performance models, and are not driven by traditional performance determinants such as size, turnover, expenses, or loads. Managers of narrowly defined equity mutual funds seem to be able to obtain, and efficiently use, private information. The performance drivers for widely defined equity mutual funds are not significantly related to private information. The strong link between fund performance and turnover for such funds suggests that their managers compensate the low precision of their private information by frequently trading on that information.

Assessing the relevance of DPI as a performance driver for actively managed mutual funds is important for conceptual, empirical, and practical reasons. Conceptually, it challenges the hypothesis of informationally efficient markets. If the market is informationally efficient, abnormal returns obtained by active portfolio managers equalize information-acquisition costs, meaning that the net performance of such portfolios is not related to their DPI. In practice, there are market imperfections that may justify such a link. Fund managers may chase performance for their clients or hold assets with high DPI simply to appear to have stock-picking talents. In this case, one should rather observe a negative link between DPI and performance. Which effect prevails most, effective use of private information, stellar performance, or marketing strategy designed to place the funds in specific market niches, is obviously an empirical matter.

Empirically, our study is important for two reasons. First, it provides an additional test of the capacity of FSRV to capture private information effects. Researchers using this measure admit that FSRV may capture omitted effects that are not related to private information. Second, we propose a new way for classifying actively managed mutual funds. Since private information is a legitimate performance driver, we expect that considering this variable in mutual fund studies provides a clearer assessment of other variables on fund performance and management characteristics. Finally, our results are useful for professionals that wish to ascertain common stocks' DPI in order to distinguish market segments representing rich information sources for their professional expertise.

Our paper is organized as follows. The next section is concerned with the issue of measuring private information. It describes the traditional FSRV measure of price informativity and shows some of its drawbacks. This section also proposes an improved measure of common stocks private information, designated by DPI2, derived from the traditional FSRV measure. The third section describes our empirical methodology. The fourth section provides a description of our database and mutual fund sample. The fifth section presents the empirical analysis on the stock market that tests the capacity of our DPI measures to capture private information effects. The sixth section presents the empirical analysis on the link between DPI and fund performance and other management characteristics. This section is followed by a conclusion.

Measuring funds' DPI

Following the literature, we define "private information" as information (1) being relevant for assessing the firms' value, (2) possessed by only a limited number of investors, and (3) not reflected by stock prices. Evaluating funds' DPI is a complicated issue since the private information detained by fund managers is unobservable. Funds' size, turnover, expenses, or the investment objective may provide an indication of their DPI, but these proxies are undoubtedly affected by large amounts of noise. Existing studies report conflicting results regarding the link between these variables and fund performance. We expect that calculating DPI directly at the fund holdings' level provides a clearer distinction between mutual funds with respect to their stock-picking skills. For this purpose, we determine DPI for each portfolio's holding stock, and then we aggregate stocks' DPI in order to obtain the entire portfolio's DPI.

The firm-specific return variation (FSRV)

The majority of existing private information measures are based on corporate finance variables or microstructure models. These measures seem insufficient in light of the empirical literature (Van Ness *et al.*, 2001). Since equity mutual funds invest in a large number of securities, we need a private information measure that is sufficiently powerful and obtainable for most market-traded common stocks. We approach funds' DPI by FSRV since this measure complies with these criteria.

FSRV is a refined measure of idiosyncratic risk, obtained by breaking up the total stock return variation in market, industrial and firm-specific movements. Durnev *et al.* (2004) suggest the following time-series regression for determining FSRV of each common stock *i*:

$$R_{i,t} = \beta_{i,0} + \beta_i^{SIC3} R_{i,t}^{SIC3} + \beta_i^m R_t^m + \varepsilon_{i,t} \quad (1)$$

The notations are as follows: $R_{i,t}$ is the return of stock *i* over the period *t*; $R_{i,t}^{SIC3}$ is the return of a value-weighted portfolio including all securities belonging to the same three-digit industry as the target security *i* and excluding this one[3]; R_t^m is the return of the market portfolio; and $\varepsilon_{i,t}$ is an error term. The regression (1) decomposes the total return variation into a systematic part $\beta_i^{SIC3} r_{i,t}^{SIC3} + \beta_i^m r_t^m$ and a firm-specific part $\varepsilon_{i,t}$. FSRV is measured by the residual return variance relative to its total variance. This is precisely one minus the R^2 from the regression (1).

[3] This exclusion eliminates the spurious correlation between industry returns and stock returns for industries with a small number of firms.

FSRV has been initiated by French & Roll (1986) and Roll (1988), and used by numerous studies as a proxy for stock price "informativeness". The intuition of FSRV is that higher firm-specific return movements indicate higher amounts of firm-specific information reflected by stock prices to uninformed investors, i.e. higher price informativity. The latter refers to the capacity of stock prices to reveal high amounts of private information relative to the total amount of private information detained by informed investors. Stocks with higher price informativity are thus characterized by lower DPI since a large part of the private information is made available by observing stock prices. At the other extreme, stocks with low price informativity are characterized by high DPI. Such stocks are affected by high amounts of noise, making it hard to extract private information from stock prices.

While existing measures of private information seem insufficient, FSRV has a solid conceptual justification and provides robust empirical results. Conceptually, specific risk may be appropriate for capturing private information effects since asymmetrically informed investors hold *undiversified* portfolios. They optimally choose to incur specific risk for two reasons. First, they invest more than the market portfolio in securities on which they possess superior, private information. Symmetrically, they invest less than the market portfolio in securities on which they are uninformed in order to hedge against the "information-risk" pertaining to such securities. Higher levels of private information engender higher amounts of specific risk that investors optimally choose to incur in order to diminish the information risk in their portfolios. The amount of specific risk investors choose to hold in their portfolios may thus provide an indication of the amount of private information in their portfolios.

Durnev *et al.* (2004) provides an alternative conceptual justification for the capacity of specific risk to capture private information effects. These authors justify specific return movements by the arrival of new information on firm-specific factors. If specific return movements are strong, prices convey probably large amounts of firm-specific information, i.e. prices are highly informative. Following this line of reasoning, the ratio between the specific stock return variation and its total return variation captures the amount of information revealed by prices relative to the total amount of information. Durnev et al. (2004) declare: "*we suggest that, in a given time interval and all else being equal, higher firm-specific variation stems from more intensive informed trading due to a lower cost of information, and hence indicates a more informative price … In a market with many risky stocks, during any given time interval, information about the fundamental value of some firms might be cheap, while information about the fundamental value of others might be dear. Traders, ceteris* *paribus, obtain more private information about the former and less about the latter. Consequently, the stock prices of the former, moving in response to informed trading, are both more active and more informative than the stock prices of the latter …”*.

The capacity of FSRV to gauge price informativity effects is corroborated by empirical results obtained in the field of international finance, corporate investment, and accounting. Morck *et al.* (2000) shows that idiosyncratic risk is higher in well developed countries, since these countries have freer press and more efficient financial analysis systems (Bushman *et al.*, 2004). Durnev *et al.* (2004) shows that firms with higher FSRV have more efficient capital investment policies and improved corporate governance since there are less informational asymmetries between managers and investors. Such firms exhibit additionally a stronger link between stock returns and changes of future earnings (Durnev *et al.*, 2001), meaning that stock returns have higher predictive capacity (Collins *et al.*, 1987).

FSRV: A measure of “information asymmetry” or “price informativeness”?

While FSRV provides robust empirical results, there are still some unanswered questions about its capacity to gauge private information effects. An intriguing aspect is that the “traditional” specific risk, determined with the market model, is frequently used in the empirical literature as a measure of *information asymmetry* between investors. Some authors declare that firms with high total return variance (Easley *et al.*, 2002) or high specific return variance (Bhagat *et al.*, 1985; Blackwell *et al.*, 1990; Best *et al.*, 2003) are less known by the market and thus more subject to adverse selection problems. This interpretation is *opposed* to the one proposed by Durnev *et al.* (2004). The studies considering the specific risk as a measure of information asymmetry obtain inconclusive empirical results. For example, the empirical findings by Clarke & Shastri (2001) and Van Ness *et al.* (2001) suggest that specific risk is a *noisy*, imperfect measure of information asymmetry which deserves closer attention.

This puzzle is even more intricate by recent empirical studies showing inconclusive results on the link between specific risk and stock returns. In a paper entitled “*Idiosyncratic risk matters*”, Goyal & Santa-Clara (2003) document a significant *positive* relation between returns and specific risk determined at the aggregate stock market level. This finding suggests that specific risk is a measure of information asymmetry, *not* price informativeness. Bali *et al.* (2005) in a paper entitled “*Does Idiosyncratic Risk Really Matter?*“ show that there is actually no significant relation between idiosyncratic risk and returns. They claim that the results obtained by Goyal & Santa-Clara (2003) are driven by their particular sample period and empirical methodology. In light of these results, idiosyncratic risk does not appear to capture private information effects, neither information asymmetry, nor price informativeness.

A possible explanation of these contrasting results is that the traditional empirical specification of idiosyncratic risk controls exclusively market-level informational effects. The influence of informational effects associated with other omitted common factors of risk may obscure the power of specific risk to capture firm-level informational effects. The FSRV measure proposed by Durnev *et al.* (2004) is a more sophisticated measure of idiosyncratic risk, since it controls for industry-related effects as well. The relevance of industries for capturing informational effects attributed to common factors of risk, and thus to explain stock return variations, has been put forward by a significant number of studies[4]. This may explain why the empirical results obtained with FSRV are more consistent than those based on the "rough", exclusively market-based, definition of specific risk[5].

An improved FSRV measure

The brief panorama on idiosyncratic risk shows that it may be a relevant measure of private information, provided that the effects of other common factors of risk are controlled for. Our study takes a step further and improves FSRV by taking into account informational effects attributed to the "size" and "book-to-market" factors of risk. These factors of risk have proven to be important in explaining stock return variation[6]. We purport that eliminating the influence of these well-established factors generating returns will improve the capacity of the firm-specific return variation to gauge firm-level, private information effects.

The empirical study of Roll (1988) is particularly relevant for our issue. He observes that the R^2 from the market model is strongly and positively related to the firm size[7]. Thus, higher idiosyncratic risk is associated with lower firm size. If size effects are not controlled for, one would erroneously conclude that the common stocks of smaller firms have more informative prices and have consequently lower levels of private information. This would contradict a large body of the literature showing that large firms are better known by the market. The size

[4] Foster (1980), Foster (1981), Eckbo (1983), Szewczyk (1992), Moskowitz & Grinblatt (1999).
[5] Durnev *et al.* (2004), Morck *et al.* (2000), Durnev *et al.* (2001).
[6] Fama & French (1992), Fama & French (1993), Fama & French (1996).
[7] A first explanation given by Roll (1988) for the higher R^2 of large firms is that large firms have many divisions and operate in several distinct industries. This hypothesis is nevertheless rejected by his empirical results.

influence on idiosyncratic risk is even more severe for portfolios of stocks. After forming portfolios of randomly selected small firms, Roll (1988) observes that the relation between portfolios R^2 and their size is extremely strong. This result is particularly harmful when studying the private information for mutual funds. For example, “Small Capitalisation” Funds would exhibit low levels of private information, an unacceptable result. We take the view that FSRV must be refined by removing the explanatory influences of additional factors of risk in order the remaining volatility to be related *exclusively* to firm-level private information.

The study of Roll (1988) clearly shows that, in order to account for firm-level informational effects, idiosyncratic risk must be controlled for the effects of other common factors of risk than the market factor. First, Roll (1988) shows that industry effects account for a significant part of the stock return variation. Moreover, the link between the R^2 and firm size becomes much less significant when considering a five-factor APT model for stock returns. We interpret these results as evidence of the necessity to control stock return variation for other common factors of risk in order to distinguish the part of return variation attributed exclusively to firm-level informational effects. Durnev *et al.* (2004) control idiosyncratic risk for market-level and industry-level factors. Our innovation is to control idiosyncratic risk for factors of risk that have clearly proven to explain a large part of the stock return variation, even larger than the traditional stocks’ beta: the “size” and BM” factors.

Durnev *et al.* (2004) determines FSRV as the $(1\text{-}R^2)$ from the regression (1), i.e. the stock relative residual variance in a model controlling stock returns for market and industry-level effects. They apply a logistic transformation to the relative residual variance in order to improve its econometric properties. We denote this FSRV measure by “$FSRV_1$”:

$$FSRV_{1,i} = \ln\left(\frac{1-R_i^2}{R_i^2}\right) \quad (2)$$

where R_i^2 is the R^2 from the time-series regression (1) performed for each common stock *i*.

Our improved FSRV measure, denoted $FSRV_2$, controls $FSRV_1$ for the firm’s size and BM. Fama & French (1992) observe that these factors, along with the stock’s beta, influence significantly stock returns. More recently, Easley *et al.* (2002) employ the Fama & MacBeth (1973) methodology and document a strong cross-sectional effect of the firm size on stock returns. We have also performed a cross-sectional regression of $FSRV_1$ on the firm’s size and

BM using the Fama & MacBeth (1973) methodology. These factors have a positive, highly significant, influence on $FSRV_1$ especially the firm's size. Based on these results, we define our "improved" FSRV measure, hereafter denoted $FSRV_2$, by the standardized residual of the projection, at each instant *t*, of $FSRV_1$ on the firm's size and its *BM* ratio.

$$FSRV_{1,i,t} = \alpha + \beta^{Size} SIZE_{i,t} + \beta^{BM} BM_{i,t} + \varepsilon_{i,t} \Rightarrow FSRV_{2,i,t} = \varepsilon_{i,t} / \sigma_{\varepsilon_t} \quad (3)$$

where α, β^{Size}, and β^{BM} are the regression coefficients, and ε_i is the residual from the regression. Following Fama & French (1992), the size of the firm *i* during the period *t* is approached by the natural logarithm of its market value of equity at the beginning of the period, $Ln\left(ME_{i,t}\right)$. $BM_{i,t}$ represents the logarithm of the ratio between the market value of equity, and its book value, at the beginning of the period, $Ln\left(ME_{i,t} / BE_{i,t}\right)$.

Our study is not concerned with price informativeness, but rather with the stocks' degree of private information (DPI), an opposite concept. The distinction between these two concepts is based on the premise that the total amount of new information about a firm decomposes in two parts. The first part, related to the concept of price informativeness, is made known to investors by public announcements, or is revealed by stock prices. The second part, related to the concept of information asymmetry, remains unknown to some investors (private information) since prices cannot reveal perfectly the available information. Consequently, the relative part of information revealed to investors (price informativeness) is opposed to the relative part of the information remaining private (DPI).

Following this line of thought, we define our DPI measures as the opposite of the two previous FSRV measures. The DPI derived from the traditional $FSRV_1$ will be hereafter denoted DPI_1, while the DPI derived from our improved $FSRV_2$ will be denoted by DPI_2:

$$\begin{aligned} DPI_{i,1} &= -FSRV_{i,1} \\ DPI_{i,2} &= -FSRV_{i,2} \end{aligned} \quad (4)$$

We calculate the DPI of all funds holding stocks' on the entire analysis period by running the time-series regression (1) for the traditional $FSRV_1$ measure and then the cross-sectional regression (3) for our improved $FSRV_2$ measure. We then take the opposite of $FSRV_1$ and $FSRV_2$ in order to approach the stocks' DPI. In order to calculate the funds' DPI, we aggregate holding stocks' DPI with value-weighted means, the weights representing the value held by the fund in each holding stock.

Empirical methodology and data

Our objective is to test if mutual funds holding stocks with higher DPI exhibit higher performance. Because stocks with higher DPI are less known by the market, managers of actively managed funds should give special consideration to such stocks. The ability of funds to pick underpriced stocks cannot be exercised on stocks that are already known by the market, i.e. stocks on which investors are symmetrically informed. More actively managed funds should invest in stocks with higher DPI, for expertise purposes, in order to deliver superior performance. Thus, if fund performance is measured at the holding stocks' level, it should be positively related to DPI. If fund performance is measured at the TNA level, i.e. net of expenses, the theory predicts a non significant relation between DPI and performance.

Testing the capacity of DPI to capture private information effects

In a first step, we wish to gauge the power of DPI_1 and DPI_2 to capture private information effects by studying their impact on stock returns. We relate stock returns over a given period t to their DPI at the end of the previous period. In order to test the robustness of our results, and to compare them with those obtained by previous studies, we additionally consider traditional factors of risk such as the stocks' beta, the firm's size, and the BM ratio. For this purpose, we follow Easley *et al.* (2002) and estimate the following regression with the Fama & MacBeth (1973) methodology:

$$r_{it} - r_{ft} = \gamma_{0,t} + \gamma_{1,t}\beta_{i,t-1} + \gamma_{2,t}SIZE_{i,t-1} + \gamma_{3,t}BM_{i,t-1} + \gamma_{4,t}DPI_{i,t-1} + \varepsilon_{it}$$

In this model, the notations are as follows: r_{it} is the rate of return of the stock i and r_{ft} is the risk-free rate of return over the month t; $\gamma_{j,t}$, $j = 1,...,4$ are the estimated coefficients; $\beta_{i,t-1}$, $SIZE_{i,t-1}$, and $BM_{i,t-1}$ are the firm's beta, the natural logarithm of market value of equity, and the natural logarithm of the book-to-market ratio over the period $t-1$, respectively; ε_{it} is the error term.

The regressions are performed each month on the analysis period, and then the coefficient estimates are averaged through time. For comparison purposes, the firm's beta, the logarithm of market value of equity, and the logarithm of the book-to-market ratio are determined with the Fama & French (1992) methodology. Consistent with the theory, we expect a *positive* relation between private information and cross-sectional stock returns since investors require an information-risk premium. We thus expect a positive and significant average coefficient on *DPI*.

Analysing the impact of DPI on fund performance

After gauging the informational power of the DPI measures, we address the impact of funds' DPI on their performance and other fund characteristics. We use the Fama & MacBeth (1973) methodology since it takes into account the funds' characteristics at each instant in time. Moreover, the Fama & MacBeth (1973) methodology is relevant from the econometrical perspective since it accounts for cross-correlation and heteroscedasticity problems. For each fund *i* and each month *t*, we run the following regression:

$$AR_{it} = \gamma_{ot} + \gamma_{1t} DPI_{i,t} + \left(\gamma_{2t} SIZE_{i,t} + \gamma_{3t} TURNOVER_{i,t} + \gamma_{4t} EXPENSES_{i,t} + \gamma_{5t} LOADS_{i,t}\right) + \varepsilon_{it} \quad (5)$$

The notations are as follows. AR_{it} represents the excess return of the fund *i* over the month *t*, and is considered as the fund's performance determined at the instant *t*. $DPI_{i,t}$ is the fund's degree of private information, determined by aggregating holding stocks' DPI over the period *t* with value weights. *SIZE* is the logarithm of fund's total net assets under management. *TURNOVER* is the fund's turnover ratio, *EXPENSES* is the fund's expense ratio, *LOADS* are loads charged by the fund, and ε_i is the error term.

Excess returns are the difference between realized returns and normal (expected) returns. They reflect the funds' over-performance relative to the risk-free rate and the risk-premiums engendered by the funds' exposure to the traditional market, size, book-to-market, and momentum factors of risk. The funds' exposure to these factors of risk is determined by running the following regression on the entire period with available fund return data:

$$r_{it} - r_{ft} = ALPHA_i + \beta_i^M (r_{mt} - r_{ft}) + \beta_i^{SMB} SMB_t + \beta_i^{HML} HML_t + \beta_i^{MOM} MOM_t + \varepsilon_{it} \quad (6)$$

The notations are as follows: r_{it} is the return of the fund *i* over the period *t*; r_{ft} is the risk-free rate of return; $ALPHA_i$ is the regression's intercept; r_{mt} is the return on the market portfolio; SMB_t is the difference in returns between small and large capitalization stocks *t*; HML_t is the difference in returns between high and low book-to-market stocks; MOM_t is the difference in returns between stocks with high and low past returns; ε_{it} is the error term. The fund's performance AR_{it} is thus the difference between the fund return over the period t and the risk premiums determined in (6).

$$AR_{it} = r_{it} - r_{ft} - \beta_i^M (r_{mt} - r_{ft}) - \beta_i^{SMB} SMB_t - \beta_i^{HML} HML_t - \beta_i^{MOM} MOM_t \qquad (7)$$

The funds' performance AR_{it} determined in (7) is based on the Carhart's (1997) model. We have additionally considered the funds' performance AR_{it} by considering exclusively the market factor (Jensen, 1968), and the market factor along with the SMB and HML factors (Fama & French, 1993). According to REE models considering asymmetrically informed investors, we expect mutual fund managers to hold stocks that beat the market portfolio by the same amount as information-acquisition costs. Since the empirical specification proposed in (5) considers the fund performance determined at the TNA level, i.e. *net* of expenses, we expect the average coefficient on $DPI_{i,t}$ to be *non significant*. Moreover, since performance is measured net of information acquisitions costs, it should be *non significantly* related to the expense and turnover ratios, unless other market imperfections may justify a significant link.

In order to provide further insights into the capacity of fund managers to select undervalued stocks, we additionally consider the fund performance at the *portfolio holding stocks* level. In this case, the funds' performance AR_{it} in (7) is determined by aggregating holding stocks' alphas over the entire portfolio. This provides us with an aggregate measure of the funds' alpha. The holding stocks' alphas represent the difference between realized stock returns and normal (expected) stock returns. Expected returns are determined by running the regression (6). They represent the sum between the risk-free rate and the risk premiums associated with the exposition of the common stock to the market, size, book-to-market, and momentum factors of risk. The stocks' alpha is thus determined as in (7) by considering stock returns, not fund returns. In order to check the sensitivity of our results, we also consider exclusively the market factor (Jensen, 1968), and the market factor along with the SMB and HML factors (Fama & French, 1993) for calculating the stocks' alpha.

When considering the funds' performance AR_{it} at the portfolio holding stocks' level, we expect the average coefficient on DPI in regression (5) to be *significantly positive*. The portfolio performance is, indeed, determined *before* information-acquisition costs. REE models with asymmetrically informed investors predict a positive relation between the amount of private information detained by investors and the performance of their portfolio. Moreover, we expect the fund performance to be *positively* related to the expense ratio since it is a proxy for information acquisition costs. Fund performance should be positively related to the turnover ratio as well, since turnover may reflect information-based transactions realized by fund managers.

Data

The sample consists of 1084 actively managed equity funds with available data between 01/01/1986 and 31/12/2000. The data are extracted from several sources. The *CDA-Spectrum Thomson Financial Database* provides time-series quarterly holdings data for mutual funds on the American market. We eliminate holdings in mutual funds, warrants and rights. For each portfolio holding company, the CDA-Spectrum database provides the CUSIP code allowing us to identify the corresponding company in the *CRSP US Daily Stocks Database*. We are thus able to find detailed information for virtually all fund holding companies. The third database we use is the *CRSP Survivorship-Bias Free Mutual Fund Database*. It provides adjusted monthly returns and detailed information about the mutual funds' management characteristics and their strategic investment objective. Finally, data on the book-to-market ratio are extracted from the *Datastream* database.

Our analysis is performed on the American market. The sample comprises actively managed equity mutual funds whose primary investment objective is in equity securities. We have considered all the funds in the CRSP Mutual funds database with sufficient available data and for which the "Strategic Insight Fund Objective" is "Growth" (458 funds), "Growth and Income" (307 funds), "Small-Company Growth" (158 funds), "Growth MidCap" (71 funds), "Aggressive Growth" (57 funds) and "Income and Growth" (33 funds). Since the first three categories include funds that are widely defined, we denote them by "diversified" equity funds. The other three categories include funds that are more narrowly defined, and will thus be designated by "specialized" equity funds. Some mutual funds change their strategic investment objective during the analysis period. When we aggregate fund characteristics on the entire analysis period, we assign each fund the investment objective appearing the most frequently on the analysis period. All the other characteristics are aggregated with equally-weighted means.

The CRSP and CDA mutual funds databases have no common fund identifier. These databases are merged using similarities between fund names. We eliminate funds whose names do not allow us to unmistakably link them in the two databases. Because a single fund in the CDA database may correspond to several fund shareclasses in the CRSP database, we aggregate shareclasses characteristics from the CRSP database before matching them to the corresponding fund in the CDA database. This aggregation is done with equally weighted and TNA-weighted means for expenses and turnover, and by summing up shareclasses TNA. We have also performed our analyses by considering, for each fund in CDA, only the shareclasse with the highest TNA. Since all these procedures give similar results, we aggregate shareclasses characteristics with equally-weighted means and provide only the results corresponding to this procedure.

For each mutual fund retained in our sample, we require a minimum five-year period of data available simultaneously for monthly returns, in the CRSP database, and holding stocks, in the CDA database. This guarantees a sufficiently long period for performance evaluation and a sufficient representativeness of dead funds in order to alleviate the effect of the survivorship bias[8]. We use the CRSP Value-Weighted Market Index as a benchmark for fund performance. Adjusted returns for this index are extracted from the CRSP daily stocks database. The risk-free rate of return is measured by the 30 day Treasury-bill rate of return.

Table 1 provides descriptive statistics on the management characteristics of our fund sample, and some characteristics of their holding stocks. There is a striking distinction between diversified and specialized equity funds with respect to their management characteristics. Specialized funds exhibit lower size, and higher expenses and turnover. Turnover and expense ratios are especially strong among “Aggressive” and “MidCap” growth funds. On the contrary, specialized funds charge lower loads than diversified funds. They are younger and followed by a higher number of managers. Specialized funds hold stocks with lower size and value, as measured by the logarithm of the market value of equity and the logarithm of the ratio between the market and book value of equity. These results suggest that specialized fund managers are more oriented toward private information acquisition.

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[8] One could think that the survivorship bias is not an important issue since our analysis is cross-sectional. Actually, the comparison between funds with differing degrees of private information may be misleading under the survivorship bias. Funds with higher DPI are expected to be riskier, thus more likely to disappear. In this case, funds with higher DPI will artificially exhibit superior performance relative to the other funds.

Measuring holding stocks' DPI

This section describes the estimation of the DPI1 measure and of our improved DPI2 measure. The first sub-section reports some descriptive statistics on these measures. The second sub-section tests the capacity of these two measures to capture private information effects by analyzing their relation to stock returns.

The DPI1 and DPI2 measures

In order to measure the amount of private information of a common stocks *i* over a given month *t*, we run the regression (1) with weekly returns on a two-year period (104 returns) centered on month *t* for all the holding common stocks of our fund sample. The market index is the CRSP value-weighted index including all firms on the NYSE, AMEX and NASDAQ markets and excluding the firms in the same industry as the stock *i*. Similarly, the industry index is a value-weighted average excluding the firm *i*, which prevents spurious correlations in the regression in industries that contain few firms. This provides us with the $FSRV_1$ measure for 421 974 holding common stocks on the analysis period between January 1986 – December 2000. The private information measure *DPI1* is the opposite of the logistic transformation (2) applied to $FSRV_1$.

To obtain *DPI2*, each month *t* on the analysis period from January 1986 to December 2000, we project *DPI1* with a cross-sectional regression on the firm size and book-to-market (BM) at the end of the previous month. The latter are taken as the logarithms of the market value of equity, and the logarithm of the ratio between the market value and book value of equity, respectively. We follow Fama & French (1992) and eliminate negative book values, then we set BM values inferior to the 0.005 and superior to the 0.995 fractiles equals to these fractiles respectively. The BM ratio is obtained from the *Datastream* database. For the firms for which the BM ratio is not available we have projected the FSRV1 measure only on the firm's size[9]. Our DPI2 measure is the opposite of the FSRV2 measure from this cross-sectional regression.

The figure 1 presents the distribution of the DPI1 and DPI2 measures while table 2 reports some descriptive statistics on these two measures. The FSRV for the companies considered in our sample accounts for an average of 87% of the total return variation. Roll (1988) has found

[9] In unreported studies, we have observed that considering only the sample of firms for which the BM ratio is available does not change our results fundamentally. The same is true if we project FSRV1 only on the firm's size, not its BM ratio.

a value of 76% for its sample over the period 1982–1986. Over this period, the number of small companies is lower relative to our (more recent) analysis period. Small companies have generally higher specific risk, which may explain the difference between the results. Durnev *et al.* (2001) and Durnev *et al.* (2004) find an average FSRV of about 80% but these studies consider companies of bigger size. Indeed, their sample situates at the intersection between the *CRSP* and *COMPUSTAT* databases, the latter being less exhaustive on small companies relative to the *CRSP* database.

Informal tests

As a first check of the reasonableness of the hypothesis that DPI1 and DPI2 capture private information effects, table 3 provides correlation coefficients between the stocks' alphas, their exposure to the traditional market, SMB, HML, and MOM factors, and the DPI1 and DPI2 measures lagged one month. Our objective is to see if higher amounts of stock private information are associated with higher information-risk premiums. The holding stocks' betas have been estimated for each given month *t* over the period 1982–1986 by running the regression (6) with monthly returns on a four-year (48 returns) period centered on the month *t*. Then, the holding stocks' alpha for each given month has been determined by subtracting the expected return from the realized return as in (7).

As expected, the DPI1 and DPI2 measures are highly correlated, with a correlation coefficient of 0.71. Contrary to DPI2, the DPI1 measure presents a low correlation with stock excess returns, and even lower correlation with stocks' alphas whichever the factors of risk that are controlled for. In light of these results, DPI1 fails to capture private information effects since it does not account for the private information risk premium embedded in stocks returns. Moreover, DPI1 is strongly related with the firm's size, as shown by the correlation coefficient with the stock's Beta SMB (-0.21). On the contrary, DPI2 exhibit a strong positive correlation with subsequent stock excess returns and alphas, whichever the factors of risk that are controlled for. Moreover, the size effect on DPI2 is by far lower than on DPI1.

The capacity of DPI2 to account for the information risk premium is also supported by the results reported in table 4. Each month on the analysis period we have sorted the common stocks in our sample independently by their DPI, approached successively by DPI1 and DPI2, and by their size. Then, the characteristics of these portfolios have been averaged through time with equally-weighted means. Among these characteristics, we have considered the number of stocks, the average firm size, stocks' excess returns, and the alphas determined previously. The portfolios' excess returns and alphas are equally weighted means of the excess returns and alphas of the stocks in the portfolios.

The evidence on the capacity of DPI1 to capture private information effects is mixed. If size is controlled, i.e. inside each class of size, the stocks' excess returns and alphas increase gradually with DPI1. But if size is not controlled for, this relation is no more linear, except for excess returns. Moreover, DPI1 is less able to distinguish small firms with high DPI and high firms with low DPI. There are indeed only 3.5 and 14.1 firms in these portfolios respectively. DPI2 has a higher capacity to distinguish the firms based on their DPI and size, since the number of firms in each of the 15 portfolios is similar. Moreover, the linear relation between DPI2 and stocks' excess returns and alphas is stable whichever the size class and whichever the factor of risk that is controlled for.

Asset pricing tests

The univariate results obtained previously suggest, in line with the findings of Roll (1988), that the traditional DPI1 measure is strongly influenced by size effects. We have investigated this issue by performing the following Fama & MacBeth (1973) regression of DPI1 on the firm size and its BM ratio calculated as mentioned previously :

$$DPI1_{i,t} = \gamma_{0,t} + \gamma_{1,t} SIZE_{i,t} + \gamma_{2,t} BM_{i,t} + \varepsilon_{i,t} \quad (8)$$

The coefficient estimates are presented in table 5. When only the SIZE variable is considered (Model 1), the average coefficient on this variable explains 46% of the cross-sectional DPI1 variation with a Student *t* as high as 94.77. The BM variable (Model 2) adds a low explanatory power to the regression but is highly significant. After the addition of the BM variable, the explanatory power of the SIZE variable becomes even higher. The traditional DPI1 measure clearly captures common factor effects that are not controlled in the regression (1). The residual from the regression (8) is thus expected to better capture firm-specific private information since it removes the strong influence of the SIZE and BM factors.

A formal test of the capacity of DPI1 and DPI2 to capture private information effects is provided in table 6. For comparison purposes, this test is similar to the one proposed by Easley *et al.* (2002). Basically, it relates stock excess returns to the firm exposure to the traditional market (Beta), SIZE and BM factors of risk. Along with these factors of risk, the test considers the firm exposition to the private information factor of risk approached by DPI1 and DPI2. The regression is performed with the methodology of Fama & MacBeth (1973)[10].

The table 6 confirms the low capacity of the DPI1 measure to capture private information effects. Considered alone, or along with the stocks' beta, DPI1 is insignificant for explaining stock excess returns. When the firm size, or its BM ratio, is included in the regression, the DPI1 variables becomes highly significant, with a *t*-Student of 8.16. On the contrary, the DPI2 variable is significant for explaining stock returns, whatever the factors of risk considered in the regression. The other results reinforce those obtained by previous studies. While the explanatory power of beta is low, the SIZE and BM factors have a significant impact on stock excess returns. In all asset pricing models, the DPI2 variable strongly dominates the other ones, suggesting that the private information factor has a stronger effect on stock returns than the traditional factors of risk. These results are similar to those obtained by Easley *et al.* (2002).

Mutual fund analysis

This section analyses the impact of DPI on fund performance and their management characteristics. We first provide a description of mutual funds DPI for our sample. Then we estimate several models of performance measurement, and study the link between fund performance and their DPI.

Funds' DPI

The funds' DPI is determined in several steps. First, for each fund, we calculate the DPI of each holding stock *i*, and month *t*, on the analysis period. As mentioned before, this is done by running the regression (1) with weekly returns for each holding stocks on a two-year period centered on the month *t* (105 weekly returns). This procedure allows determining each stock's DPI for each month during the analysis period[11]. Then, the fund's DPI for a given month *t* is obtained by aggregating stocks' DPI with value-weighted means. The weights are the value of

[10] We have additionally considered the methodology of Litzenberger & Ramaswamy (1979). They suggest weighting the coefficient estimates in time-series averages by their precision in the cross-sectional regressions. This correction improves the Fama & MacBeth (1973) procedure which is inefficient under time-varying volatility. The results obtained by applying this procedure do not change our interpretations and consequently will not be exposed.

[11] Following the existing literature, we choose only CRSP stocks having a sharecode of 10 or 11, which represents common stocks of US firms.

stocks held by the fund at the end of the *previous* month. The value of the stocks held by the fund during a given month *t* is obtained by multiplying the number of stocks held at the end of the previous quarter by the stock price at the end of the previous month (*t-1*). Even if CDA Spectrum provides quarterly holdings data, we consider the funds' DPI each month, not each quarter. Funds' DPI varies from month to month, even if the securities held during the quarter are the same. Indeed, the stocks' DPI change from month to month, and the value of the stocks held by the funds as well, since the stock price vary during each holding quarter.

Table 7 provides descriptive statistics on funds' DPI for our sample of 1084 mutual funds. We are able to obtain 70146 fund-month observations for DPI on our analysis period. For comparison, we have calculated the funds' DPI successively with DPI1 and DPI2. The DPI1 measure provides surprising results. With this measure, narrowly defined funds exhibit lower levels of private information than diversified equity funds. Moreover, "SmallCap" equity funds have the lowest level of private information. According to our previous analysis, this unrealistic result is driven by size and BM effects. Roll (1988) shows that the influence of size on DPI1 is particularly strong for portfolios of small firms. DPI2 provides, on the contrary, more convincing results. Specialized equity funds exhibit higher levels of private information than diversified equity funds. "SmallCap" equity funds exhibit now the highest level of private information. Since DPI2 appear to better capture private information effects for common stocks and mutual funds, we will use this measure in our subsequent analyses.

In order to get more insights on the link between funds' DPI and their management characteristics, each month we have constructed 15 portfolios of funds by sorting them independently based on their DPI (five classes) and TNA (three classes). Then, for each portfolio of funds, we have calculated equally-weighted averages of relevant fund parameters such as TNA, turnover, expenses, loads, and funds' betas with respect to the market, SMB, HML and MOM factors of risk. Table 8 shows that funds' DPI is related to their characteristics in a consistent manner. Higher DPI is associated with a lower TNA, number of holding stocks, and higher expense and turnover ratios. The link between DPI and fund turnover is particularly striking. Moreover, funds with higher DPI exhibit higher market betas and have, as expected, a higher exposition to the size SMB factor.

More formal results on the link between DPI and fund characteristics are provided in Table 9. For each month, we have calculated cross-sectional bivariate correlation coefficients between DPI and fund characteristics. Then, these coefficients have been averaged through time for the entire analysis period. Since specialized and diversified funds have distinct management characteristics, the results are presented separately for each category of fund. Most of the correlation coefficients have the expected sign and are significant. DPI is negatively related to the number of stocks held by the funds and funds' TNA, but this relation is driven by diversified funds. For all categories of funds, DPI is significantly related to expenses and turnover, especially for diversified funds. A particular feature of specialized funds is the highly significant, positive relation between loads and DPI. Funds with high DPI clearly charge higher loads, most probably in order to recoup larger research costs. The positive link between DPI and beta SML is expected, since firms with lower size are less known by the market.

Asset pricing tests

This section analyses the ability of fund managers to exploit their private information by considering the link between funds' alphas and their DPI. According to the theory, we expect a non-significant link between net fund performance and DPI. Alternatively, we expect a positive link between the performance calculated at the common stock holdings' level (i.e. performance before expenses) and DPI.

We first determine funds' alphas at the TNA level, i.e. net of information-acquisition costs, with returns obtained from the CRSP Mutual Fund database. For this purpose, we estimate the funds' exposure to the traditional factors of risk (betas) by running the regression (6) on the entire period of data availability. Then we use these factor loadings in order to calculate the fund abnormal return, according to the regression (7). This provides us with an alpha measure of fund performance during each month. Our second measure of performance is the alpha calculated at the portfolio holding stocks' (hereafter "PHS") level. This is obtained, for each month, by aggregating holding stocks' alphas during that month. The aggregation is done with value-weighted means, where the weights are the value held by the fund for each common stock. The monthly stocks' alphas have been determined in the first part of our study. For each given month *t*, we run the regression (6) on a four-year period centred on that month. The betas from these regressions have been used for calculating normal returns for the month *t*. The stocks' alphas for this month are thus the difference between their realized return during that month, and their expected, normal return.

Table 10 provides bivariate correlation coefficients for funds' alphas, their DPI and other management characteristics. The results are presented separately for each category of funds, specialized and diversified. For diversified funds, there is no significant link between DPI2 and funds' alphas, whatever the performance model specification, and whatever the level at which alpha is determined (TNA or PHS level). There are two important performance determinants for diversified equity funds, mainly expenses and turnover. Expenses have a strong, negative impact on fund performance determined at the TNA level. This result has been put forward by a large number of previous studies, the consensus being that mutual fund managers do not increase performance by an amount sufficient to justify expenses (Elton *et al.*, 1993)[12]. This interpretation is furthermore supported by expenses not being significantly correlated with the fund performance determined at the PHS level. Turnover has, on the contrary, a highly significant impact on the PHS-based performance, and a non significant impact on the TNA-based performance. The strong impact of turnover on the fund performance determined at the PHS level has already been put forward by Wermers (2000). He declares that at least a portion of the higher return obtained by mutual funds with high turnover pertains to better stock-picking capacities.

The picture for the specialized fund sample is different in many respects. First, the TNA-based fund performance is significantly correlated with the PHS-based performance. This is true whatever the performance model specification. Second, DPI has a significant impact on the fund performance determined at the portfolio holding stocks level, but a non significant impact on TNA-based performance. Third, expenses have a low negative influence on the TNA-based performance, but a significant positive influence on the PHS-based performance. Fourth, turnover has a positive and significant impact on fund performance, whatever the performance model specification and whatever the level at which the performance is calculated (TNA or PHS). These results provide a strong support for REE models with asymmetrically informed investors. Finally, loads are negatively and significantly correlated with fund alphas for all model and level specifications. This result has already been put forward at the TNA level by Carhart (1997). He explains the negative impact of loads by high-load funds having higher turnover rates, thus higher transaction costs. While diversified equity funds exhibit indeed a positive link between turnover and loads, this relation is

[12] Other interpretations have been given as well. Malkiel (1995) decomposes expenses in information-acquisition costs and other types of costs, such as check-writing or bookkeeping services. He finds a non-significant relation between fund performance and the part of expenses attributed to information-acquisition costs.

insignificant for specialized funds (see table 9). In unreported analyses, we have calculated the correlation coefficients between fund alphas and the contemporaneous load, in order to see if fund managers change loads depending on performance. We still find a negative impact of loads on fund performance. It appears that fund managers charge loads that do not justify the performance obtained.

In order to see if the impact of DPI on fund performance is merely an influence of traditional performance determinants, we run a Fama & MacBeth (1973) regression based on the model (5). We include all the explanatory variables in (5). Unreported tests show that the results are robust to the exclusion of any subset of explanatory variables. The results, presented in table 11, reinforce the previous findings. Diversified equity funds exhibit a non significant link between DPI and performance, whatever the performance model specification. On the contrary, specialized funds exhibit a highly significant link between DPI and performance at the PHS level, but a non-significant link at the TNA level. The relation between DPI and fund performance is especially strong when the fund performance is determined at the PHS level with the Carhart's (1997) model. In line with our previous discussion, this result may be explained by the capacity of the Carhart's (1997) model to control for the influence of common factors of risk and thus to make clearer the relation between fund performance and DPI.

Conclusion

As far as we know, existing empirical studies have not yet considered the relation between the amount of private information of mutual fund holding stocks, and the ability of fund managers to obtain and exploit this private information in order to select undervalued securities. This paper takes the view that private information is the main performance driver for actively managed mutual funds. Active management makes little sense if fund managers do not pick securities with high amounts of private information. Private information should thus be an important variable for distinguishing mutual funds with superior performance from others.

We have measured funds' DPI in an accurate manner, by aggregating fund holdings stocks' DPI. The latter is the opposite of the "firm-specific return variation", FSRV. FSRV has been extensively used as a measure of price informativity (Durnev *et al.*, 2001; Durnev *et al.*, 2004). We have improved this measure by removing the influence of common factors of risk that have proven important for explaining stock returns, such as the size and BM factors.

After controlling the influence of these factors, we show that our improved measure has a higher capacity to capture private information effects.

Our mutual fund analysis strongly supports REE models with privately informed investors. These models predict that informed investors detain portfolios concentrated in securities they know better, i.e. securities with high degrees of private information, and obtain superior performance relative to uninformed investors. One should thus expect a positive relation between funds' DPI and their selectivity performance. Consistent with the theory, we find that collectively, actively managed equity funds earn just enough in order to recoup information acquisition costs. More precisely, our results over the 1986 – 2000 period on the American market show that TNA-based performance is insignificantly related to funds' DPI, while the PHS-based performance is positively and significantly related to funds' DPI.

While our results are globally consistent with the theory, the distinction between diversified and specialized funds shows results necessitating further research. The relation between DPI and PHS-based fund performance is positive and highly significant for specialized equity funds. On the contrary, diversified equity funds with higher DPI do not appear to earn superior PHS-based performance. These results suggest that diversified equity funds do not justify their expenses by private information acquisition. One possibility is that such funds acquire low precision private information on a large number of common stocks with low DPI. These funds may trade frequently with such stocks, and this trade may represent their main performance driver. The strong relation between turnover and PHS-based performance for such funds corroborate this hypothesis. An alternative explanation is that our DPI measure is not able to capture sufficiently well the DPI for common stocks with low levels of private information. This calls for future research in investigating more sophisticated measures of private information.

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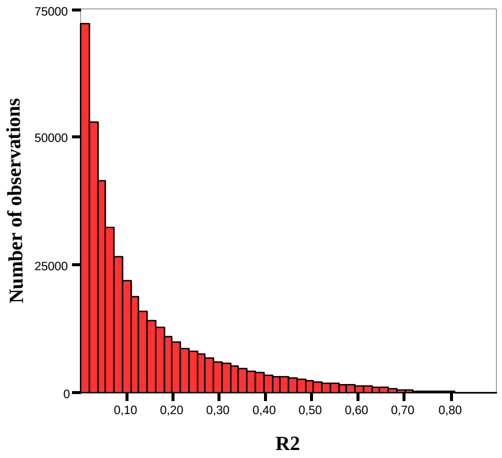
Table 1

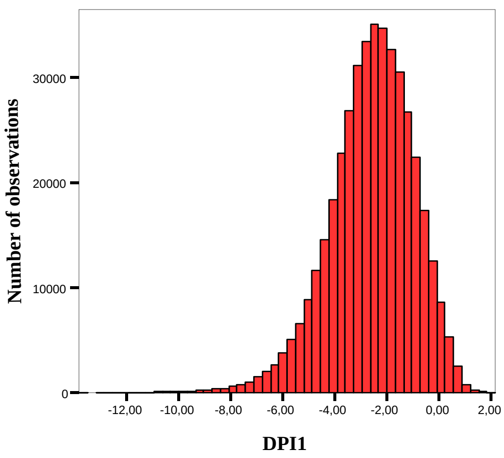
Mutual Fund Summary Statistics

The table presents averages of quarterly cross-sectional averages on the period 1986 – 2000. "Total Number of funds" represents the total number of surviving and dead funds on the analysis period. The other variables have been determined at each quarter and then they have been averaged through the quarters on the analysis period. "Average Number" represents the average number of funds existing during quarters. "TNA" (Total Net Assets) is the closing market value of securities owned, plus all assets, minus all liabilities. "Turnover" (over the calendar year) is the minimum of aggregate purchases of securities or aggregate sales of securities, divided by the average TNA of the fund. "Expenses" (over the calendar year) designates the percentage of the total investment that shareholders pay for the mutual fund's operating expenses. "Loads" (load fees) are the maximum sales charges applied at the time of the initial purchase plus maximum deferred sales charges (the maximum sales charges the investor owes when withdrawing money from an investment) plus redemption fees (fees charged to shareholders who sell fund shares within a short period of time). "Stock" represents the percentage invested in common stocks by mutual funds, while "Cash" represents the percentage held by the fund in safe instruments and investments that can be quickly liquefied. "Number of managers" represents the number of managers since fund inception. "Number of years" represents the number of years since the fund organization date. "Holding stocks' Ln(BE/ME)" represents the natural logarithm of the ratio between the book value and market value of equity for fund holding stocks. "Holding stocks' Ln(ME)" represents the natural logarithm of the market value of the equity for fund holding stocks. The last column presents the test of difference in means between the corresponding characteristics of diversified and specialized equity mutual funds. The *t*-statistic is presented between parentheses. One, two, and three stars represent a significance level of 0.10, 0.05, and 0.01, respectively.

Characteristics	CRSP SIFO (Strategic Insight Fund Objective)								All funds	Difference in means (Diversified - Specialized)
	Diversified equity funds				Specialized equity funds					
	Growth	Growth and Income	Income and Growth	All diversified equity funds	Aggressive Growth	Growth MidCap	Small Cap Growth	All specialized equity funds		
Total Number of funds	458	307	33	798	57	71	158	286	1084	-
Average Number	174.0	120.1	11.9	306.0	25.5	17.3	52.1	94.9	400.8	-
Avg TNA ($ millions)	865.7	1473.2	728.6	1098.3	496.8	764.1	392.6	488.6	953.7	609.7 (25.4)***
Avg Turnover	.774	.616	.595	.705	1.149	1.139	.918	1.020	.780	-.316 (-33.2)***
Avg Expenses (%)	1.22	1.08	1.20	1.17	1.56	1.33	1.30	1.37	1.22	-.204 (-27.1)***
Percentage with Load (%)	49.7	50.3	58.2	50.2	54.9	49.2	43.6	47.6	49.6	-
Avg Max Loads (%)	4.99	5.19	5.06	5.07	4.79	4.94	4.57	4.71	4.99	0.36 (17.73)***
Avg Stock (%)	90.7	90.0	90.3	90.4	90.5	94.6	92.8	92.6	90.9	-4.6 (-24.0)***
Avg Cash (%)	6.97	6.17	4.85	6.57	7.69	5.11	6.12	6.36	6.52	.21 (3.0)***
Avg Number of years	20.91	24.78	15.60	22.23	19.21	13.09	15.50	16.06	20.77	6.17 (51.4)***
Avg Number of managers	4.04	4.26	3.89	4.12	4.29	3.94	4.39	4.28	4.16	-.15 (-9.0)***
Avg Number of holding stocks	76.9	126.6	95.2	97.1	75.0	93.4	105.3	95.0	96.6	2.10 (1.7)*
Avg Holding stocks' Ln(ME)	8.62	9.02	9.17	8.80	7.69	7.89	6.35	6.99	8.37	1.81 (151.9)***
Avg Holding stocks' Ln(BE/ME)	1.027	1.003	.964	1.015	.908	.993	.703	.810	.965	.21 (54.6)***

Panel A





Panel B

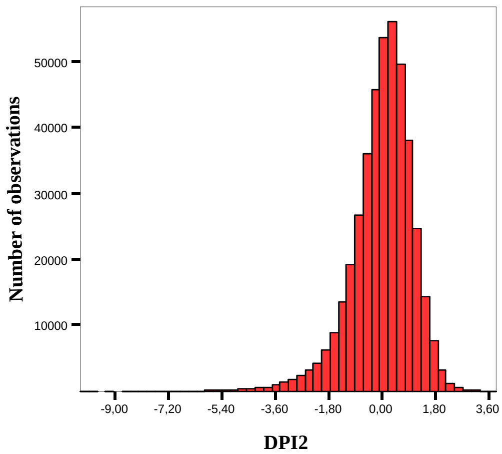


Figure 1. Parameter distribution. The figure shows the distribution of the degree of private information (DPI) for common stocks on the American market on the period 1986-2000. DPI1 is based on the "firm-specific return variation" measure proposed by Durnev *et al.* (2004). DPI2 is the standardized residual from the projection of DPI1 on the firm size and book-to-market. Panel A shows, at its right, the R^2 from the regression (1) and, at its left, DPI1 defined as in (4). Panel B shows the distribution of DPI2.

Table 2

DPI Summary Statistics

This table presents descriptive statistics on the DPI1 and DPI2 measures on the American market for the period 1986-2000. DPI1 is based on the “firm-specific return variation” measure proposed by Durnev et al. (2004). DPI2 is the standardized residual from the projection of DPI1 on the firm size and book-to-market.

Variable	Mean	Median	Minimum	Maximum	Std Deviation
R^2	.135	.079	.000	.898	.147
DPI1	-2.564	-2.452	-13.816	2.177	1.598
DPI2	-.010	.109	-10.186	3.830	1.021

Table 3

Correlation coefficients

This table presents correlation coefficients between common stocks DPI, their alphas and their exposure to the SMB, HML and MOM factors of risk on the American market for the period 1986-2000. The correlation coefficients are calculated for each given month, and then they are averaged on the entire analysis period. The stocks’ DPI is approached by the DPI1 and DPI2 measures. DPI1 is based on the “firm-specific return variation” measure proposed by Durnev et al. (2004). DPI2 is the standardized residual from the projection of DPI1 on the firm size and book-to-market. Three, two and one stars correspond to a significance level of 0.01, 0.05, and 0.10 respectively.

	DPI2	Excess Return	Alpha (Jensen)	Alpha (FF)	Alpha (Carhart)	Beta	Beta SMB	Beta HML	Beta Mom
DPI1	0.707***	0.012*	0.006	0.000	0.001	0.177***	-0.214***	-0.091***	-0.005
DPI2		0.040***	0.035***	0.033***	0.034***	0.141***	0.038***	-0.026***	-0.021***
Excess Return			0.980***	0.931***	0.929***	-0.006	-0.002	-0.012	0.008
Alpha (Jensen)				0.944***	0.941***	-0.020***	-0.003	-0.022	0.008
Alpha (FF)					0.982***	-0.012**	0.021**	-0.024**	0.018**
Alpha (Carhart)						-0.006	0.014*	-0.044***	-0.030***
Beta							0.105***	-0.155***	-0.140***
Beta SMB								0.314***	0.047***
Beta HML									0.267***

Table 4

Portfolio parameters

This table shows average parameters for portfolios sorted independently in 5 quintiles of DPI (degree of private information) and three groups of size during each month on the analysis period from January 1986 to December 2000. The stocks' DPI is measured by the DPI1 (Panel A) and DPI2 (Panel B). DPI1 is based on the "firm-specific return variation" measure proposed by Durnev et al. (2004). DPI2 is the standardized residual from the projection of DPI1 on the firm size and book-to-market.

Panel A: DPI approached by DPI1

DPI1	Firm size							
	1 - Small	2	3 - Large	All firms	1 - Small	2	3 - Large	All firms
	Avg Number of Stocks				Avg Firm Size ($ Millions)			
1 - Low	350,9	116,4	14,1	481,7	15,7	111,9	2268,0	104,7
2	257,5	186,5	38,0	482,3	18,6	123,9	1511,7	177,2
3	144,2	242,0	95,9	482,3	22,8	137,5	1610,4	396,3
4	46,6	202,1	233,6	482,3	27,6	161,3	2527,8	1294,9
5 - High	3,5	56,7	421,6	481,9	36,4	211,3	6790,6	5966,6
	Avg Excess Return (monthly, %)				Avg Alpha (Jensen) (monthly, %)			
1 - Low	1,403	-0,493	-0,475	0,890	0,838	-1,172	-1,208	0,292
2	1,641	0,139	-0,062	0,930	0,940	-0,609	-0,865	0,202
3	2,360	0,541	0,084	0,994	1,430	-0,298	-0,732	0,133
4	3,659	1,540	0,579	1,277	2,597	0,549	-0,344	0,312
5 - High	5,061	2,894	1,142	1,375	3,897	1,592	0,201	0,393
	Avg Alpha (Fama & French) (monthly, %)				Avg Alpha (Carhart) (monthly, %)			
1 - Low	0,965	-0,854	-0,805	0,474	1,040	-0,847	-0,792	0,531
2	0,964	-0,313	-0,543	0,355	1,049	-0,298	-0,526	0,407
3	1,228	-0,036	-0,453	0,260	1,376	0,049	-0,377	0,361
4	1,837	0,705	-0,116	0,415	2,004	0,800	-0,004	0,525
5 - High	2,860	1,640	0,265	0,446	2,958	1,781	0,353	0,540

Panel B: DPI approached by DPI2

DPI2	Firm size							
	1 - Small	2	3 - Large	All firms	1 - Small	2	3 - Large	All firms
	Avg Number of Stocks				Avg Firm Size ($ Millions)			
1 - Low	189,3	160,4	131,8	481,5	18,9	133,5	9477,6	2647,0
2	135,2	157,0	189,9	482,1	19,3	147,0	5684,7	2292,2
3	131,4	160,2	190,5	482,1	19,7	148,4	3452,8	1418,9
4	152,4	167,5	162,3	482,1	19,3	144,4	2713,5	969,5
5 - High	194,3	158,6	128,8	481,7	16,7	135,8	2100,1	613,1
	Avg Excess Return (monthly, %)				Avg Alpha (Jensen) (monthly, %)			
1 - Low	0,656	-0,367	0,127	0,169	0,142	-1,060	-0,615	-0,466
2	0,998	0,186	0,484	0,530	0,335	-0,605	-0,382	-0,254
3	1,531	0,462	0,778	0,878	0,871	-0,409	-0,162	0,037
4	2,177	1,077	1,172	1,455	1,389	0,168	0,197	0,562
5 - High	3,353	2,207	1,314	2,428	2,463	1,143	0,288	1,445
	Avg Alpha (Fama & French) (monthly, %)				Avg Alpha (Carhart) (monthly, %)			
1 - Low	0,313	-0,735	-0,409	-0,235	0,393	-0,726	-0,327	-0,178
2	0,438	-0,313	-0,205	-0,061	0,559	-0,290	-0,100	0,022
3	0,889	-0,112	-0,011	0,200	1,001	-0,031	0,100	0,301
4	1,343	0,379	0,328	0,665	1,396	0,465	0,430	0,746
5 - High	2,161	1,202	0,397	1,371	2,278	1,321	0,419	1,464

Table 5

The impact of size and BM on DPI1

This table presents the coefficient estimates for the regression (8) of common stocks' DPI on their SIZE and BM factors. The analysis is performed on the American market and concerns 421974 stock-month observations on the period from January 1986 to December 2000. DPI1 is based on the "firm-specific return variation" measure proposed by Durnev et al. (2004). The firm Size and Book-to-Market (BM) are the logarithms of the market value of equity, and the logarithm of the ratio between the market value and book value of equity, respectively. We follow Fama & French (1992) and eliminate negative book values, then we set BM values inferior to the 0.005 and superior to the 0.995 fractiles equals to these fractiles respectively. The regression is performed cross-sectionally, for each month during the analysis period, and then the coefficient estimates are averaged through time, with the Fama & MacBeth (1973) methodology.

	SIZE	BM	R^2
Model 1	0.49 (94.77)***		0.46
Model 2	0.50 (98.02)***	0.08 (9.04)***	0.47

Table 6

Asset pricing tests for common stocks

This table presents Fama & MacBeth (1973) estimates for the regression of common stocks' excess returns on their DPI. The analysis is performed on the American market on the period from January 1986 to December 2000. The stocks' DPI is measured by the DPI1 and, alternatively, with DPI2. DPI1 is based on the "firm-specific return variation" measure proposed by Durnev et al. (2004). DPI2 is the standardized residual from the projection of DPI1 on the firm size and book-to-market. The firm Size and Book-to-Market (BM) are the logarithms of the market value of equity, and the logarithm of the ratio between the market value and book value of equity, respectively. We follow Fama & French (1992) and eliminate negative book values, then we set BM values inferior to the 0.005 and superior to the 0.995 fractiles equals to these fractiles respectively. The regression is performed cross-sectionally, for each month during the analysis period, and then the coefficient estimates are averaged through time, with the Fama & MacBeth (1973) methodology. *t*-statistics are provided between parentheses. Three, two and one stars correspond to a significance level of 0.01, 0.05, and 0.10 respectively.

		DPI (%)	Beta (%)	SIZE (%)	BM (%)	R^2 (%)
DPI estimated with DPI1	Model 1	0.11 (1.48)				0.94
	Model 2	0.09 (1.27)	0.11 (0.54)			1.81
	Model 3	0.65 (8,16)***	0.09 (0.46)	-0.56 (-6,97)***		2.70
	Model 4	0.61 (6.13)***	0.59 (2.14)**	-0.46 (-3.97)***	0.58 (3.56)***	4.48
DPI estimated with DPI2	Model 1	0.72 (6.95)***				0.68
	Model 2	0.71 (7.87)***	-0.05 (-0.27)			1.47
	Model 3	0.69 (7.98)***	0.09 (0.46)	-0.24 (-3.55)***		2.69
	Model 4	0.65 (6.10)***	0.59 (2.14)**	-0.17 (-1.73)*	0.61 (3.74)***	4.48

Table 7

Parameters for portfolios of mutual funds sorted by size and DPI

This table reports descriptive statistics on funds DPI (degree of private information) for 1084 actively managed equity mutual funds representing 70146 fund-month observations. The analysis is performed on the American market, on the period from January 1986 to December 2000. The funds' DPI at each given month *t* is obtained by aggregating holding stocks' DPI during that month. The funds' DPI is approached by two measures, the "traditional" DPI1, and our improved measure, DPI2. DPI1 is the opposite of the "firm-specific return variation" measure proposed by Durnev et al. (2004). DPI2 is the standardized residual from the projection of DPI1 on the firm size and book-to-market.

			Mean	Median	Minimum	Maximum	Std Deviation
DPI1	Diversified equity funds	Growth and Income	-0,936	-0,917	-4,957	0,757	0,472
		Growth	-1,046	-0,996	-4,801	0,935	0,563
		Income and Growth	-0,974	-0,974	-2,620	0,199	0,394
		All diversified equity funds	-1,000	-0,959	-4,957	0,935	0,526
	Specialized equity funds	Aggressive Growth	-1,250	-1,163	-5,785	0,459	0,718
		Growth MidCap	-1,293	-1,274	-4,169	0,712	0,520
		Small Cap Growth	-1,894	-1,869	-4,627	0,331	0,679
		All specialized equity funds	-1,611	-1,577	-5,785	0,712	0,734
	All funds		-1,145	-1,057	-5,785	0,935	0,637
DPI2	Diversified equity funds	Growth and Income	-0,255	-0,243	-1,773	1,243	0,294
		Growth	-0,173	-0,165	-2,089	1,759	0,325
		Income and Growth	-0,273	-0,254	-1,153	0,684	0,281
		All diversified equity funds	-0,209	-0,201	-2,089	1,759	0,314
	Specialized equity funds	Aggressive Growth	-0,007	-0,001	-2,060	1,220	0,322
		Growth MidCap	0,057	0,078	-1,849	1,439	0,255
		Small Cap Growth	0,106	0,104	-2,176	1,621	0,284
		All specialized equity funds	0,067	0,074	-2,176	1,621	0,294
	All funds		-0,144	-0,140	-2,176	1,759	0,331

Table 8

Parameters for portfolios of mutual funds sorted by size and DPI

This table reports average parameters for portfolios of funds sorted independently in 5 quintiles of funds' DPI (degree of private information) and three groups of size during each month on the analysis period from January 1986 to December 2000. The analysis is performed for 1084 actively managed equity mutual funds on the American market, on the period from January 1986 to December 2000. The funds' DPI is measured by aggregating their holding stocks' DPI approached by DPI2. DPI2 is the standardized residual from the projection of DPI1 on the firm size and book-to-market. DPI1 is based on the "firm-specific return variation" measure proposed by Durnev et al. (2004).

DPI2	Firm size							
	1 - Small	2	3 - Large	All funds	1 - Small	2	3 - Large	All funds
	Avg Number of Funds				Avg Number of stocks (%)			
1 - Low	25.7	23.1	24.8	74.60	70.96	73.20	135.54	92.97
2	21.6	24.6	28.6	75.22	99.23	106.06	159.73	124.58
3	22.9	25.0	27.1	75.26	66.62	83.27	123.07	92.81
4	25.3	25.6	24.2	75.22	64.97	98.85	125.64	95.99
5 - High	28.9	26.1	19.6	74.81	57.96	72.26	110.03	76.57
	Avg TNA ($ Millions)				Avg Tunover (%)			
1 - Low	24.5	167.7	3207.7	1143.4	69.36	64.99	54.26	62.90
2	25.7	164.3	3186.9	1279.9	73.13	68.02	61.03	66.81
3	26.3	163.0	2730.9	1050.5	81.04	75.24	73.34	76.31
4	23.8	162.9	2243.7	786.3	86.95	84.52	85.13	85.53
5 - High	23.1	160.5	1694.5	510.4	100.73	98.34	94.53	98.26
	Avg Expenses (%)				Avg Loads (%)			
1 - Low	1.50	1.14	0.87	1.17	2.19	2.36	2.29	2.28
2	1.35	1.10	0.87	1.09	2.41	2.45	2.81	2.58
3	1.42	1.15	0.95	1.16	2.26	2.53	3.01	2.63
4	1.45	1.22	1.06	1.24	2.35	2.41	2.66	2.47
5 - High	1.72	1.28	1.17	1.42	2.32	2.45	2.54	2.42
	Avg Beta				Avg Beta SMB			
1 - Low	1,030	1,042	1,049	1,040	0,015	-0,007	-0,042	-0,013
2	1,062	1,067	1,073	1,067	0,069	0,027	-0,004	0,027
3	1,080	1,095	1,117	1,098	0,166	0,146	0,121	0,142
4	1,121	1,144	1,165	1,143	0,357	0,348	0,299	0,336
5 - High	1,186	1,256	1,258	1,230	0,571	0,580	0,531	0,564
	Avg Beta HML				Avg Beta MOM			
1 - Low	0,000	0,013	-0,003	0,003	-0,152	-0,148	-0,158	-0,154
2	0,016	0,004	-0,010	0,002	-0,155	-0,157	-0,164	-0,159
3	0,065	0,018	-0,005	0,024	-0,150	-0,148	-0,173	-0,158
4	0,119	0,077	0,040	0,080	-0,118	-0,138	-0,163	-0,139
5 - High	0,087	-0,019	0,026	0,033	-0,159	-0,190	-0,181	-0,176

Table 9

Correlation coefficients between DPI and fund characteristics

This table presents percentage correlation coefficients between our DPI2 measure, alphas, and management characteristics for 1084 actively managed funds on the American market. The coefficients are estimated for each monthly cross-section, and then the correlation coefficient estimates are averaged through time. In order to avoid spurious correlation, TNA is considered with a one-year lag. Moreover, we follow Carhart (1997) and consider loads lagged one year in order to account for the possibility that fund managers change loads in response to performance. The *t*-statistic of the hypothesis that the mean correlation coefficient is null is provided between parentheses. Three, two and one stars correspond to a significance level of 0.01, 0.05, and 0.10 respectively.

		Nb of stocks	LogTNA	EXPENSES	TURNOVER	LOADS	BETA	BETA SMB	BETA HML	BETA MOM
Diversified Equity Funds	DPI2	-5,03 (-10,09)***	-6,37 (-9,48)***	7,51 (9,2)***	10,94 (12,21)***	-0,01 (-0,02)	26,39 (20,36)***	37,39 (27,22)***	6,38 (4,03)***	-3,01 (-2,62)***
	Nb of stocks		17,26 (22,19)***	-17,78 (-26,2)***	-7,97 (-15,03)***	11,16 (28,79)***	-3,93 (-10,79)***	-10,39 (-15,82)***	0,54 (1,16)	-0,2 (-0,48)
	LogTNA			-34,5 (-43,25)***	-1,16 (-1,98)**	10,56 (12,98)***	1,48 (3,67)***	-4,24 (-7,08)***	3,3 (7,46)***	-3,45 (-7,3)***
	EXPENSES				11,79 (17,05)***	-0,33 (-0,33)	6,62 (8,22)***	13,41 (18,45)***	-2,34 (-2,92)***	3,5 (4,45)***
	TURNOVER					2,95 (6,64)***	16,97 (29,29)***	14,78 (25,42)***	-1,86 (-1,49)	-0,24 (-0,28)
	LOADS						3,89 (8,75)***	-3,9 (-9,1)***	-5,06 (-8,83)***	-4,03 (-7,04)***
	BETA							35,87 (27,52)***	-43,07 (-31,74)***	-31,07 (-19,27)***
	BETA SMB								21,99 (13,36)***	-1,77 (-1,22)
	BETA HML									30,81 (12,34)***
Specialized Equity Funds	DPI2	-0,28 (-0,49)	-1,46 (-1,49)	4,74 (3,67)***	5,12 (3,67)***	12,17 (10,53)***	27,37 (14,72)***	27,22 (16,29)***	-9,73 (-5,87)***	-8,44 (-5,04)***
	Nb of stocks		16,09 (20,24)***	-14,55 (-27,81)***	-22,34 (-32,68)***	6,36 (8,82)***	-13,63 (-18,42)***	6,55 (7,62)***	13,72 (22,84)***	5,26 (11,92)***
	LogTNA			-29,38 (-31,29)***	-3,21 (-3,28)***	-2,27 (-2,72)***	6,95 (12,88)***	-2,12 (-2,24)**	-4,24 (-5,47)***	-3,66 (-3,82)***
	EXPENSES				12,83 (10,79)***	11,76 (11,38)***	10,99 (9,52)***	8,81 (6,55)***	-7,8 (-5,49)***	-2,41 (-1,46)
	TURNOVER					-1,41 (-1,53)	21,95 (23,31)***	-10,57 (-8,57)***	-8,87 (-5,32)***	-5,98 (-4,98)***
	LOADS						13,91 (16,93)***	-0,66 (-0,7)	-5,11 (-5,64)***	-7,23 (-8,41)***
	BETA							19,76 (12,95)***	-51,82 (-39,65)***	-34,29 (-17,74)***
	BETA SMB								17,58 (14,5)***	8,87 (6,5)***
	BETA HML									50,58 (29,34)***

Table 10

Correlation coefficients between DPI and fund characteristics

This table presents percentage correlation coefficients between alphas and management characteristics, including DPI2, for 1084 actively managed funds on the American market. The coefficients are estimated cross-sectionally each month, then the correlation coefficient estimates are averaged through time on the entire analysis period. In order to avoid spurious correlation, TNA is considered with a one-year lag. Moreover, we follow Carhart (1997) and consider loads lagged one year in order to account for the possibility that fund managers change loads in response to performance. "HS" stands for "Holding Stocks". The *t*-statistic of the hypothesis that the mean correlation coefficient is null is provided between parentheses. Three, two and one stars correspond to a significance level of 0.01, 0.05, and 0.10 respectively.

		ALPHA (Jensen)	ALPHA (Fama & French)	ALPHA (Carhart)	HS ALPHA (Jensen)	HS ALPHA (Fama & French)	HS ALPHA (Carhart)
Diversified equity funds	ALPHA (Fama & French)	89,44 (109,39)***					
	ALPHA (Carhart)	87,83 (105,68)***	98,3 (562,15)***				
	HS ALPHA (Jensen)	4,76 (2,76)***	2,7 (2,01)**	2,5 (1,92)*			
	HS ALPHA (Fama & French)	1,18 (0,85)	1,46 (1,27)	1,52 (1,35)	86,66 (54,27)***		
	HS ALPHA (Carhart)	1,27 (0,94)	0,59 (0,54)	0,67 (0,63)	87,97 (80,45)***	96,8 (151,01)***	
	DPI2	-1,03 (-0,7)	0,08 (0,07)	-1,07 (-0,89)	1,13 (0,73)	1,86 (1,54)	1,65 (1,34)
	LogTNA	1,06 (1,68)*	1,32 (2,21)**	1,42 (2,36)**	-0,23 (-0,39)	-0,46 (-0,79)	-0,38 (-0,64)
	EXPENSES	-3,92 (-3,93)***	-3,26 (-3,9)***	-3,76 (-4,56)***	1,22 (1,45)	1,01 (1,32)	0,86 (1,12)
	TURNOVER	-0,84 (-0,65)	0,77 (0,69)	-0,49 (-0,48)	7,32 (7,52)***	7,11 (7,99)***	7,43 (8,28)***
	LOADS	-0,59 (-1,08)	-0,48 (-0,87)	-0,06 (-0,1)	0,57 (1,05)	0,41 (0,76)	0,55 (1,01)
Specialized equity funds	ALPHA (Fama & French)	88,08 (87,76)***					
	ALPHA (Carhart)	86,4 (79,42)***	98,13 (418,62)***				
	HS ALPHA (Jensen)	7,66 (3,6)***	5,22 (2,93)***	4,94 (2,74)***			
	HS ALPHA (Fama & French)	4,18 (2,33)**	4,16 (2,4)**	4,28 (2,45)**	87,29 (55,81)***		
	HS ALPHA (Carhart)	4,00 (2,18)**	3,26 (1,88)*	3,4 (1,96)*	88,71 (73,71)***	97,07 (188,75)***	
	DPI2	0,52 (0,25)	0,74 (0,41)	-0,57 (-0,32)	3,63 (1,77)*	3,47 (1,95)*	4,04 (2,25)**
	LogTNA	-1,63 (-1,54)	-0,89 (-0,92)	-0,02 (-0,02)	0,8 (0,78)	0,65 (0,62)	1,16 (1,12)
	Expenses	-3,02 (-2,02)**	-2,17 (-1,47)	-1,74 (-1,21)	2,87 (1,93)*	3,1 (2,05)**	2,96 (1,93)*
	Turnover	3,63 (2,03)**	4,5 (2,79)***	5,72 (3,53)***	10,2 (7,09)***	9,55 (6,55)***	10,21 (6,94)***
	Loads	-4,37 (-4,5)***	-3,24 (-3,51)***	-3,08 (-3,25)***	-3,7 (-3,26)***	-3,04 (-2,67)***	-2,68 (-2,31)**

Table 11

Asset pricing tests for mutual funds

This table presents the coefficient estimates for the regression of 1084 actively managed equity mutual funds' alphas on their DPI and other traditional performance determinants. The analysis is performed on the American market on the period January 1986 – December 2000. Each month, the funds' alphas are regressed on DPI2, Size, Expenses, Turnover, and Loads, and then the coefficient estimates are averaged through time with the Fama & MacBeth (1973) methodology. Funds' alphas are estimated as explained in the text, at the TNA level, and at the portfolio holding stocks ' level, with the Jensen's (1968), Fama & French (1993), and Carhart's models. The *t*-statistic of the hypothesis that the mean correlation coefficient is null is provided between parentheses. Three, two and one stars correspond to a significance level of 0.01, 0.05, and 0.10 respectively.

All equity funds

		DPI2 (%)	SIZE (%)	EXPENSES (%)	TURNOVER (%)	LOAD (%)	R^2 (%)
TNA level	Jensen	0.017(0.10)	-0.008(-1.21)	-0.975(-3.77)***	0.205(0.57)	-0.715(-2.24)**	11.20
	Fama & French	0.092(1.12)	-0.001(-0.13)	-0.69(-3.81)***	0.559(2.22)**	-0.625(-2.3)**	7.04
	Carhart	-0.014(-0.18)	0.002(0.33)	-0.697(-3.94)***	0.461(1.91)*	-0.385(-1.41)	6.64
Portfolio holding stocks' level	Jensen	0.205(0.92)	0.004(0.53)	0.299(0.8)	2.81(7.77)***	-0.409(-0.85)	9.70
	Fama & French	0.231(1.95)*	0.007(0.83)	0.52(1.55)	2.456(7.24)***	-0.496(-1.15)	6.93
	Carhart	0.217(1.8)*	0.009(1.12)	0.428(1.28)	2.587(8.07)***	-0.277(-0.66)	7.10

"Diversified" equity funds

		DPI2 (%)	SIZE (%)	EXPENSES (%)	TURNOVER (%)	LOAD (%)	R^2 (%)
TNA level	Jensen	0.024(0.21)	-0.003(-0.49)	-0.82(-3.39)***	-0.067(-0.2)	-0.242(-0.74)	8.87
	Fama & French	0.066(0.89)	0.002(0.35)	-0.575(-3.17)***	0.227(0.98)	-0.124(-0.39)	6.76
	Carhart	-0.002(-0.03)	0.002(0.3)	-0.621(-3.45)***	-0.02(-0.09)	0.127(0.4)	6.41
Portfolio holding stocks' level	Jensen	0.109(0.65)	-0.008(-0.98)	-0.081(-0.27)	2.605(7.40)***	0.475(0.99)	8.14
	Fama & French	0.128(1.14)	-0.007(-0.98)	0.022(0.09)	2.227(7.44)***	0.352(0.82)	6.41
	Carhart	0.095(0.86)	-0.006(-0.85)	-0.03(-0.13)	2.337(8.11)***	0.397(0.93)	6.54

"Specialized" equity funds

		DPI2 (%)	SIZE (%)	EXPENSES (%)	TURNOVER (%)	LOAD (%)	R^2 (%)
TNA level	Jensen	0.236(0.89)	-0.042(-2.19)**	-1.067(-1.89)*	0.689(1.23)	-3.047(-3.51)***	17.61
	Fama & French	0.219(1.56)	-0.014(-0.94)	-0.529(-1.14)	0.905(2.13)**	-1.954(-2.58)**	14.88
	Carhart	0.105(0.75)	0.002(0.1)	-0.318(-0.7)	1.096(2.57)**	-1.883(-2.49)**	14.77
Portfolio holding stocks' level	Jensen	0.607(1.90*	0.033(1.47)	0.971(1.28)	4.117(5.75)***	-4.712(-3.53)***	18.19
	Fama & French	0.474(2.85)**	0.035(1.54)	1.073(1.61)	3.547(5.06)***	-3.622(-2.87)***	16.65
	Carhart	0.625(3.20)***	0.041(1.21)**	0.947(1.41)	3.68(5.33)***	-3.052(-2.55)**	17.33