The Role of Institutional Investors in Equity Trading: An Explanation of the Home Bias Puzzle*

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Abstract

This paper postulates that management performance evaluation is a source of divergence between institutional investors and households' optimal portfolio decisions. In a partial equilibrium setting, the objective of a representative household is modeled as the maximization of expected utility (an increasing and concave function, in order to accommodate risk aversion) of final wealth. Yet, the institutional investor is assumed to maximize utility (same type of function) of final wealth minus a benchmark.

Under these assumptions, the optimal portfolio choices of both types of investors are derived and compared. The specific objective function of the representative institutional investor is shown to induce a divergence between her optimal portfolio and that of the representative household.

We study the effects of this optimal strategy in asset trading on a simple one-period equilibrium model and obtain a multibeta CAPM; as a novelty, a new factor-risk is brought into the analysis: the *active management risk*. This new beta is defined as the normalized (to the benchmark's variance) covariance between asset's excess return and the excess return of the market over the benchmark index.

We test this model using a data sample of 220 US securities and the S&P 500 as the benchmark index. The sample consists of monthly returns from January, 1973 through December, 1997. We show that the index is relevant in order to explain the excess return of domestic securities. The test supports the predictions of the model.

As an extension of the previous results to an international framework, we show that the model provides an alternative explanation of the home bias puzzle. In a partial equilibrium setting, the specific objective function of the representative institutional investor induces a home bias in her portfolio. The bias obtains for certain (and plausible) combinations of the volatilities of domestic and foreign asset markets and the covariances between the domestic and international securities.

I Introduction

> "Since more than one half of the world's stock and bond market capitalization is outside the US, shouldn't US pension funds allocate their assets accordingly? Maybe some day."
> (*Institutional Investor*, January 1997)

The considerable increase in both the gross amount as well as the proportion of money managed by institutional investors observed in the last two decades (remarkably during the 1990s) has prompted a growing interest in the portfolio choice decisions of these investors. A number of papers have studied this topic from different angles. The range of topics goes from investment performance measurement to institutional aspects of portfolio delegation, including agency problems between investors and managers. Among them,[1] we mention Admati and Ross (1985), Bhattacharya and Pfleiderer (1985), Dybvig and Ross (1985), Admati, Bhattacharya, Pfleiderer and Ross (1986), Grinblatt and Titman (1989), Allen (1990), Lakonishok, Shleifer and Vishny (1992a, 1992b), Brennan (1993), Sirri and Tufano (1993), Stoughton (1994), Heinkel and Stoughton (1994), Brennan (1995), Gruber (1996) and Admati and Pfleiderer (1997).

However, with the exception of Lakonishok, Shleifer and Vishny (1992a) and Brennan (1993), to our knowledge, no paper has dealt with the potential effects of institutional investors trading on stock prices. The former paper addresses two main aspects of trading by money managers: herding and positive-feedback trading.

Our paper follows Brennan (1993). A general equilibrium asset pricing model will be derived that accounts for the increasingly important role of institutional investors in capital markets. We will postulate a different objective function for the representative institutional investor as compared to the standard (risk-averse) investor. Brennan (1993) tests a similar hypothesis using montly data from January 1931 through December 1991. His test fails to totally support the proposed model.

Our model is tested on a monthly data sample from January 1973 through December 1997. The results reported in this paper seem to support the postulated objective function for the representative institutional investor. Moreover, the empirical success of the model will be shown to result in a possible violation of the market efficiency hypothesis.

The main arguments in our model come from the observation of two well documented regularities, namely

- the growing percentage of the stock market held by institutional investors (mainly mutual and pension funds) and
- the different target of individuals (households) and institutional investors in solving for their respective optimal portfolios.

[1] This list of papers does not purport to be exhaustive.

Brennan (1995) draws attention to both facts in a domestic closed economy framework. Regarding the first point, Brennan shows a permanent decline in the share of US equities held directly by individual investors in the United States since World War II (to a current ratio below 50%). A parallel increase in the ratio of mutual funds to direct holdings of US equities (rising from a negligible amount in 1970 to about 25% in 1990) has been reported by Sirri and Tufano (1993).

Figure 1 presents the evolution of the stock funds total net assets[2] as a percentage of the stock market capitalization, from January 1984 through December 1997. From 1984 to 1990, the percentage ranged between 5 % and 8%. After 1990 it has been increasing up to above 25 % in December 1997. The number of (stock) funds in the sample observed an almost tenfold increase as of January 1984. These figures seem to suggest that institutional investors (rather than households) should indeed be considered the "representative agent" in stock markets.

At this point, a question arises: Could it be argued that the (optimal portfolio choice) objective of institutional investors is different from that of households?

We postulate that management performance evaluation is a source of divergence between institutional investor and household optimal portfolio decisions. While the objective of a representative household can be modeled as the maximization of expected utility (an increasing and concave function, in order to accommodate risk aversion) of final wealth, we assume, in the spirit of Brennan (1993), that the institutional investor tries to maximize utility (same type of function) of final wealth compared to a benchmark.

It has been argued that "most mutual-fund managers actively buy and sell stocks in a bid to beat the market. Index-fund managers, called 'passive' investors, seek simply to match the performance of market indexes, such as the Standard & Poor's 500.[3]" This behavior implies that, while households will be interested in maximization of final wealth, the results of institutional investors will be compared to some benchmark, usually some index of domestic securities.

A survey by Del Guercio and Tkac (1998) reports that 59% of mutual fund investors compared fund performance to that of an index. This percentage is lower than that in the pension fund industry where virtually in all cases manager's portfolio performance is compared to an index.[4]

[2]The sample includes over 95% of the total US stock fund industry. Data provided by the Investment Company Institute (ICI). The ICI includes over 6,867 mutual funds and 447 close-end funds. Its mutual fund members represent more than 63 million individual shareholders and manage more than $ 4.8 trillion. The Wilshire 5000 Index was used as a proxy for the US stock market capitalization value.

[3]*The Wall Street Journal*, January 28 of 1997.

[4]More evidence in favor of the proposed relative performance utility function comes from the usual practice observed in the mutual fund industry when funds advertise the record of years and the percentage by which they have outperformed "the market" represented by a benchmark index (as for instance the S&P 500 Index in the case of American assets). Another example would be the ratings of mutual funds and pension plans carried out by professional rating firms: The performance

Benchmark-adjusted compensation is permitted in the US by Section 205 of the Investment Advisers Act. The fee must be a fulcrum fee, where the incentive /penalty component rises or falls symmetrically with the performance of the fund. Additionally, performance must be measured against an appropriate independent index, rather than in absolute terms. The utility function proposed in our model for the (risk averse) representative institutional investor captures all these features.

Even if not in an explicit way, the compensation of portfolio managers often depends upon their performance relative to a benchmark. Sirri and Tufano (1997) find that mutual fund investors seem to base their fund purchase decision on prior performance information, but do so asymmetrically, massively investing in funds that performed well (relative to a benchmark) the prior period but failing to flee lower performing funds at the same rate. Del Guercio and Tkac (1998) test a sample of 719 actively managed pension funds and 773 actively managed mutual fund investment products. They look for the determinants of dollar flows into pension funds and mutual funds. They include a dummy variable that equals one if the lagged annual return is higher that the S&P 500 index return over the same period and zero otherwise. This variable is statistically significant at the 1% level for the pension fund industry. They also include another dummy variable that equals one if the lagged annual return is higher than the growth index, value index or S&P 500 index return over the same period, depending if the fund is a growth, value or general equity fund, respectively. This variable is statistically significant at the 1% level for the mutual fund industry and also significant, at the 10% level, for the pension fund industry. Thus, evidence seems to indicate that even in the case of asset-based compensation contracts (the dominant form of management contract in the US whereby managers receive a fixed percent of the total value of the assets in the fund), manager reward depends implicitly on relative performance.

This paper, however, does not purport to judge neither the use of performance-based contracts in the context of portfolio management delegation or the plausible agency conflicts that might arise from it.[5] We instead take it as a common practice and concentrate on the potential asset pricing implications that might derive from it.

We therefore believe that institutional investors behave differently from households. Additionally, the former type of investor is gradually replacing the later as the "representative agent" in asset markets. This paper will show that the postulated utility function for the representative institutional investor will indeed result in a discrepancy between her optimal portfolio and that of the standard risk-averse investor (the representative household in our model). In an extension of our results to an international portfolio making framework, the model will provide useful in order to explain a relevant puzzle in the literature of international finance: the home bias puzzle. To our knowledge, no previous approach to the home bias puzzle has accounted

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of a representative index is usually presented together with the performance of each fund or plan.

[5]Some papers related to this topic are Bhattacharya and Pfleiderer (1985), Allen (1990), Stoughton (1993) and Heinkel and Stoughton (1994).

for these features. In our opinion, the relevant question in the home bias puzzle is whether institutional investors, rather than households, are optimally diversified in international stock markets.

Tesar and Werner (1995) show that the portfolios of institutional investors mirror the proportions of foreign securities in average national portfolios in the case of Canada, Germany, Japan, UK and the US. They also report that actual positions are still to a large extent lower than the limits implied by foreign investment restrictions affecting institutional investors in these countries. Although institutional investors are probably at the vanguard of overseas investment, these empirical regularities seem to imply that holdings of these investors are still lower than the standard theory of optimal diversification would suggest.

The rest of the paper is organized as follows: Section II introduces a simple pure exchange, one-period domestic closed economy. Agents can be either households or institutional investors. Assuming constant absolute risk-aversion utility functions, we will compare the optimal portfolio of both types of investors. It will be shown that the specific objective function of the representative institutional investor could actually result in a divergence between her optimal portfolio and that of the representative household. After that, market clearing conditions will be imposed and a general equilibrium (CAPM) asset pricing equation will be derived. Besides the standard systematic (market) risk-factor, a new factor will be brought into the analysis: the *active management risk*. The *active management risk* is defined as the covariance with the excess return on the market over the benchmark portfolio of institutional investors. Our model predicts a positive expected reward to the *active management risk*. Moreover, it should be increasing in the wealth managed by institutional investors. Section III contains the empirical analysis of the paper. The predictions of the (extended) CAPM derived in Section II will be tested on a monthly sample of 220 US assets, since January 1973 through December 1997. The S&P 500 index will be taken as the benchmark. Results will confirm that the *active management risk* is positively priced by the market in the last years of the sample when the proportion of total market assets managed by institutional investors rose remarkably. Empirical support of the proposed objective function of the representative institutional investor will be shown to result in a violation of the market efficiency hypothesis. Section IV will extend the model to an open-economy framework. In a partial equilibrium setting, the specific objective function of the representative institutional investor will be shown to yield a home bias in her portfolio. In fact, it is not straightforward to conclude that such an objective induces a home bias. The bias will obtain for certain (and plausible) combinations of the volatilities of domestic and foreign asset markets and the covariances between the domestic and international securities. The (equilibrium) abnormal returns we tested for in Section III will provide an alternative explanation of the home equity bias puzzle. Section V concludes the paper.

II The model

We will derive a simple one-period equilibrium model. The framework is a pure exchange economy with only one consumption good. We first solve for the optimal portfolios of the representative agents in the economy. In the spirit of Merton (1973), we assume that the market capitalization value and market index portfolio are given. In equilibrium, supply equals demand and capital markets clear.

Our target is to obtain an empirically testable model that might support the importance of the role of institutional investors in equity trading. We will focus on the effect of benchmark-adjusted compensation contracts (that characterize active institutional investors in our model) on equilibrium asset returns. Throughout this section, the model closely follows Brennan's (1993).

II.A The Agents

In this section we present the objective functions of households and institutional investors. Explicit asset demand functions will be obtained for both types of investors. In order to keep the model as simple as possible, we consider one period (t_0 is the initial date and t_1 the date the uncertainty is resolved).

We will begin by studying the optimal portfolio choice of a risk-averse institutional investor. As we explained in the introduction, the institutional investor will be assumed to care about the difference between the outcome of the portfolio and the result of a benchmark portfolio index. After solving for the optimal portfolio of the institutional investor, we will present the optimal portfolio of the standard (risk-averse) investor: our household. The objective of a representative household can be modeled as the maximization of expected utility (a CARA utility function, in order to accommodate risk aversion) of final wealth. The institutional investor tries to maximize expected utility (same type of function) of final wealth minus a benchmark. The utility function proposed for the active institutional investor will play a crucial role in our analysis. As explained in the introduction, the main argument underlying our choice is management performance evaluation. This paper does not discuss the pros and cons of benchmark-adjusted compensation[6] but takes it as an empirically established fact.

At t_0 the investor is endowed with an initial wealth $\mathcal{W}_0$ she allocates among three different assets;[7] we will denote by $\tilde{R} = (\tilde{R}_i),\ i \in \{x, y, z\}$ the vector of returns. All assets are traded in a frictionless market where unlimited short selling is allowed. We assume $\tilde{R} \sim \mathcal{N}(\mu, \Omega)$ with Ω a positive definite matrix. Investors only care about final wealth (i.e., there is no consumption at t_0). The only consumption good in the economy will be taken as the numeraire. Throughout the paper, we will use

[6] Admati and Pfleiderer (1997) deal with this topic.

[7] The number of assets is limited to three for the sake of simplicity. Obviously, all the results would go through with N assets.

superscripts i and h to denote institutional investor and household, respectively.

The (representative) household is endowed with a constant absolute risk-aversion (CARA) utility function defined over final wealth $\mathcal{W}_1$:

$$U^h(\mathcal{W}_1) = -exp[-(\pi/\mathcal{W}_0)\mathcal{W}_1], \tag{1}$$

where π is the coefficient of risk-aversion.

The institutional investor is characterized by a different CARA utility function also defined over final wealth $\mathcal{W}_1$, but compared to the outcome of an index:

$$U^i(\mathcal{W}_1) = -exp[-\pi\left(\mathcal{W}_1 - \mathcal{W}_B\right)/\mathcal{W}_0], \tag{2}$$

where $\mathcal{W}_B$ represents the final wealth attainable through a market index portfolio $\phi_{_B}$ strategy:

$$\mathcal{W}_B = \mathcal{W}_0[\phi\tilde{R}_x + (1-\phi)\tilde{R}_y],$$

with ϕ a number between 0 and 1. We assume the institutional investor takes $\phi_{_B}$ as exogenously given. The risk aversion coefficients of individual and institutional investors are assumed to be equal. No further insight is added to the model by assuming different risk aversion parameters for both kinds of investors.

Let us define $\omega' = (\omega_x, \omega_y, \omega_z)$ as the vector of wealth weights invested in the three existing securities. $\mathbf{1}$ will represent a column vector of ones.

The institutional investor maximizes expected utility of final wealth. Given the assumptions on the utility function and the distribution of the rates of return, the portfolio selection problem of the institutional investor can be expressed as:

$$\max_{\omega} \underline{\omega}'\mu - (1/2)\pi\underline{\omega}'\,\Omega\,\underline{\omega} - \lambda^i(\underline{\omega}'\mathbf{1} - 0), \tag{3}$$

with λ^i the Lagrange multiplier and $\underline{\omega}' = (\omega_x - \phi, \omega_y - (1-\phi), \omega_z)$.

Let us use $\omega_{mvp} = \Omega^{-1}\mathbf{1}(\mathbf{1}'\Omega^{-1}\mathbf{1})^{-1}$ to denote the minimum variance portfolio (in the absence of a riskfree asset). It is straightforward to see that the expected return on ω_{mvp} is $\mu_{mvp} = \mu'\Omega^{-1}\mathbf{1}(\mathbf{1}'\Omega^{-1}\mathbf{1})^{-1}$ and its volatility $\sigma^2_{mvp} = (\mathbf{1}'\Omega^{-1}\mathbf{1})^{-1}$.

After these definitions, the first order conditions of problem (3) can be stated as follows:

$$\lambda^i = \mu_{mvp} \tag{4}$$

$$\omega^i = (\phi, 1-\phi, 0)' + \pi^{-1}\Delta(\mu, \Omega), \tag{5}$$

where $\Delta(\mu, \Omega) = (\Omega^{-1} - (\mathbf{1}'\Omega^{-1}\mathbf{1})^{-1}\Omega^{-1}\mathbf{1}\mathbf{1}'\Omega^{-1})\,\mu = \Omega^{-1}(\mu - \mu_{mvp})$.

According to (5) the proposed utility function for the institutional investor induces a wedge in her optimal portfolio. This wedge, the benchmark index portfolio $\phi_{_B}$, can be shown to be the optimal portfolio of a passive (index) institutional investor with utility function $U(\mathcal{W}_1) = -\left(\mathcal{W}_1 - \mathcal{W}_B\right)^2$ who minimizes her tracking error. Thus, the minimum variance portfolio of the institutional investor coincides with the optimal portfolio of a passive (index) investor. This means that, as expressed in (5), the more risk averse the institutional investor is (implying a larger π), the closer her optimal portfolio will be to the benchmark.

This feature of the institutional investor's optimal portfolio is induced by the relative performance assumption on her utility function. Equation (2) implies an increasing utility of the institutional investor in the excess return on her portfolio over the benchmark portfolio. However, since the investor is risk-averse, equation (3) shows that her expected utility is decreasing in $\underline{\omega}' \, \Omega \, \underline{\omega}$, the variance of the difference between hers and the benchmark portfolio.

The (representative) household will maximize her expected utility of final wealth $U^h(\mathcal{W}_1)$. The solution to her problem will be:

$$\begin{aligned} \lambda^h &= \mu_{mvp} - \pi\sigma^2_{mvp} & (6) \\ \omega^h &= \omega_{mvp} + \pi^{-1}\Delta(\mu, \Omega), & (7) \end{aligned}$$

with λ^h the corresponding Lagrange multiplier in the household optimization problem.

If the household were allowed to invest in a riskfree asset with return r, the minimum variance portfolio would include no risky asset (which implies $\omega_{mvp} = \mathbf{0}$) and $\mu_{mvp} = r$. Therefore, according to equation (7), as long as some money is invested in the riskfree asset[8], the household's optimal portfolio would be

$$\omega^h = \pi^{-1}\Omega^{-1}(\mu - r\mathbf{1}). \tag{8}$$

We now compare equations (7) and (5). The difference between both optimal portfolios can be written as

$$\begin{pmatrix} \omega^i & - & \omega^h \end{pmatrix} = \begin{pmatrix} \phi \\ 1-\phi \\ 0 \end{pmatrix} - \omega_{mvp}. \tag{9}$$

The following proposition states the main conclusion to be drawn from the partial equilibrium analysis.[9]

Proposition 1 *The institutional investor's portfolio is optimal for the individual investor if and only if the benchmark portfolio is set to be the global minimum variance portfolio, i.e.* $\phi_{_B} = \omega_{mvp}$.

[8] Given the CARA exponential utility function of our household, this amounts to assuming that $\pi \neq (\mu_{mvp} - r)/\sigma^2_{mvp}$ with μ_{mvp} and σ^2_{mvp} the minimum variance portfolio mean and variance, respectively, before introducing the riskfree asset.

[9] Admati and Pfleiderer (1997) have a similar result. However, they restrict themselves to the partial equilibrium, assuming asset returns to be generated by a factor model.

The proof of this proposition follows directly from equation (9).

Proposition 1 states that, as postulated in the introduction, the utility function proposed for the institutional investor might result in a source of divergence between her optimal portfolio and the optimal portfolio of the household. The benchmark portfolios commonly used in the pension and mutual fund industries are capitalization weighted indices. It is, therefore, very unlikely that the benchmark portfolio will coincide with the minimum variance portfolio as Proposition 1 requires for the alignment of individual and institutional investor optimal portfolios. This is especially clear in the case where a riskless asset exists: The minimum variance portfolio would be a vector of zeros implying that the benchmark could not include any risky asset or the portfolio chosen by the institutional investor would not be optimal for her client.

II.B Market Equilibrium

We will use ω^h, ω^i to denote the risky portfolio proportion vectors of the representative household and institutional investor, respectively. As in the partial equilibrium presented in the last section, both investors are assumed to have CARA exponential utility functions with the same absolute risk aversion parameter π. The institutional investor is characterized by maximizing the expected utility of final wealth compared to the outcome of an index (the benchmark index) as shown in equation (2).

As in the partial equilibrium analysis, assets are assumed to be normally distributed with mean return vector μ and variance-covariance matrix Ω. Both agents have access to the same (risky) investment opportunity set. Risky assets are in positive net supply. Besides the risky assets, the household can also invest in a riskfree asset with return r. The riskless asset is supposed to be in zero net supply.

Given these assumptions, the optimal portfolios of both representative agents are given by equation (8) in the case of the household and equation (5) in the case of the institutional investor. Namely

$$\omega^h = \frac{1}{\pi}\,\Omega^{-1}\,(\mu - r\mathbf{1}) \tag{10}$$

for the household and

$$\omega^i = \phi_B + \frac{1}{\pi}\,\Omega^{-1}\left(\mu - \lambda^i\,\mathbf{1}\right), \tag{11}$$

for the institutional investor. In equation (11) $\lambda^i = \mu'\,\Omega^{-1}\,\mathbf{1}/\mathbf{1}'\,\Omega^{-1}\,\mathbf{1} \equiv \mu_{mvp}$, the minimum global variance portfolio mean return (in the absence of a riskfree asset) and ϕ_B is the exogenously given benchmark index portfolio.

Let us define W^h and W^i as the values of the portfolios controlled by the representative household and institutional investor, respectively. Let us also introduce S, the (equilibrium) value of the aggregate market portfolio of risky assets and $x_{_M}$, the market portfolio vector of weights. We assume S as well as $x_{_M}$ to be exogenously given. As in Merton (1973) if the asset market is assumed to be *always* in equilibrium, the aggregate demand D would be:

$$D = W^h\,\omega^h + W^i\,\omega^i. \tag{12}$$

Furthermore, market clearing requires $D = S\,x_{_M}$. Replacing both portfolios by their values in equations (10) and (11), the market clearing condition becomes:

$$W^i\phi_{_B} + H^{-1}\,\Omega^{-1}(\mu - R^*\,\mathbf{1}) = S\,x_{_M}, \tag{13}$$

where

$$\begin{aligned} R^* &= \frac{\mu_{mvp}W^i + rW^h}{W^i + W^h} \\ H &= \frac{\pi}{W^i + W^h}, \end{aligned}$$

with H the aggregate risk aversion coefficient.

Equation (13) can be rearranged as follows:

$$(\mu \quad - \quad R^*\,\mathbf{1}) \;= (\Omega\,(x_{_M} - \phi_{_B}) \vdots\, \Omega\,x_{_M}) \begin{pmatrix} H\,W^i \\ H\,(S - W^i) \end{pmatrix}. \tag{14}$$

The last equation will play an important role in the empirical analysis of Section III. It is therefore worthwhile to explain with some detail the main implications to be derived from it.

Equation (14) shows a general equilibrium relationship between stocks' expected (excess) return and stocks' covariance with both the market portfolio return and the excess return on the same portfolio over the benchmark index. Therefore, our model identifies two risk-factors the market should reward: the standard systematic (market) risk and the *active management risk* to be defined below. The last term in equation (14) indicates that the risk premia on both factors should be positive. Note that when $x_{_M} \equiv \phi_{_B}$ equation (14) becomes the standard Capital Asset Pricing Model (CAPM).

The positive expected return on the covariance with the market index $x_{_M}$ is the standard CAPM result: The market should only reward the risk that cannot be diversified; since agents are assumed to be risk averse, assets with a higher covariance with the market should have a proportionally higher expected excess return.[10]

[10]Notice that according to equation (14) the expected reward to the covariance with the market index is actually decreasing in the size of the total wealth managed by institutional investors. Although the main concern of this paper is not the market beta, this result could help understand the failure of this factor in explaining the cross-section of expected stock returns (see for instance Fama and French (1992).)

Yet, because of the assumptions on the particular utility function of institutional investors, an additional factor influences stocks' expected return. According to our model, due to the presence of active institutional investors, the market should also reward active management. From (14) we define the covariance vector $\Omega\,(x_M - \phi_B)$ as the measure of *active management risk*, the risk of underperforming the benchmark index return. Notice that, as stated in (14), the reward to this risk-factor should be increasing in the wealth managed by institutional investors, W^i. This factor is therefore expected to be especially significant since the late 1980s, when institutional investors started to manage a growing percentage of total market assets, and throughout the 1990s.

The following proposition summarizes the asset pricing implications derived from equation (14). These implications will be the object of the empirical analysis in Section III.

Proposition 2 *The expected reward to the covariance with the excess return of the market over the benchmark portfolio is positive. Besides, it is increasing in the size of the total wealth managed by institutional investors, W^i.*

However, the CAPM is usually presented as a linear relationship between stock's expected (excess) return and the market's expected (excess) return. Let us reconsider the market clearing condition (13). This equation can be also arranged as follows:

$$(\mu \quad - \quad R^*\,\mathbf{1}) \;= (\Omega\,\phi_B \,\vdots\, \Omega\,x_M) \begin{pmatrix} -H\,W^i \\ H\,S \end{pmatrix}. \tag{15}$$

We now introduce the following notation. We will call

$$\begin{aligned} \mu_M &= {x_M}'\,\mu \\ \mu_{\phi_B} &= {\phi_B}'\,\mu, \end{aligned}$$

the expected return on the market and benchmark indices, respectively.

We will also use $\Sigma_{\phi,M}$ to denote the variance-covariance matrix of the market and institutional benchmark indices.

Premultiplying both terms in equation (15) by $(\phi_B \,\vdots\, x_M)'$ yields

$$\begin{pmatrix} \mu_{\phi_B} - R^* \\ \mu_M - R^* \end{pmatrix} = \Sigma_{\phi,M} \begin{pmatrix} -H\,W^i \\ H\,S \end{pmatrix}. \tag{16}$$

Finally, solving for

$$\begin{pmatrix} -H\,W^i \\ H\,S \end{pmatrix}$$

in (16) and substituting into (15), we can re-write the expected (excess) return on risky assets as

$$(\mu \quad - \quad R^* \mathbf{1}) \ = (\Omega\, \phi_{_B} \vdots\, \Omega\, x_{_M})\, \Sigma_{\phi,M}^{-1} \begin{pmatrix} \mu_{\phi_B} - R^* \\ \mu_{_M} - R^* \end{pmatrix}. \tag{17}$$

The last equation is the counterpart of the traditional CAPM when institutional investors are introduced. Together with the excess return on the market index, a new regressor is brought into the analysis, namely the excess return on the benchmark portfolio of institutional investors.

Equation (17) is straightforwardly testable with the standard CAPM empirical testing procedures. Empirical confirmation of the results presented in Proposition 2 would give support to the proposed utility function for the representative institutional investor. Moreover, according to (17), the specific objective function of this investor could result in a source of abnormal (equilibrium) returns. Thus, in testing for Proposition 2, we will be implicitly testing for a possible violation of the market efficiency hypothesis.

In the next section we perform the empirical analysis of the paper. The general equilibrium asset pricing implications of the present model will be extended to an open-economy framework in Section IV. They will be shown to provide a plausible explanation of the home bias puzzle.

III Empirical analysis

In this section we will test the empirical implications derived from Proposition 2. We will use the cross-sectional regression approach of Fama and MacBeth (1973). Each month the cross-section of returns on stocks is regressed on the market index beta plus the benchmark beta. The time series means of the monthly regressions slopes then provide standard tests on whether the covariance with each of the indices (and especially the benchmark index) is on average priced. This is also the approach found in other empirical asset pricing papers like Chen, Roll and Ross (1986) and Fama and French (1992).

There is another strand of the literature partially related to our test. Papers such as Harris and Gurel (1986), Shleifer (1986), Dhillon and Johnson (1991) and, more recently, Lynch and Mendenhall (1997) use event-study methodology to test for price and volume effects associated with changes in the S&P 500 index. The bottom line of their approach is the assumption of an increasing importance of index funds in capital markets. Among these funds, the S&P 500 index funds are clearly dominant.

These papers assume that changes in the composition of the index do not convey information valuable to the market. Therefore, in an environment allegedly free of information effects, they test for abnormal returns on assets added (deleted) to (from) the index that could represent a violation of market efficiency.

A possible criticism to these tests is that, while the amount of assets indexed to the S&P 500 has more than doubled[11] since the end of 1992, almost all, if not all, of this gain has been due to the performance of the stocks in the index themselves, rather than due to net cash inflows.

Our model predicts that there should indeed be abnormal returns in association with the stock's covariance with the S&P 500 index. However, in our model abnormal returns do not arise because of the index funds' demand of assets in the benchmark. The empirical analysis in this section will show how active (and not only passive) portfolio management decisions will affect equilibrium asset prices.

III.A Description of data

We will take Standard & Poor's S&P 500 monthly index return as the return on the benchmark portfolio.[12] Datastream US index monthly return series will be taken as the market portfolio return. For the locally risk-free asset, the monthly return series of the three month Treasury Bill will be used. Our sample begins in January, 1973 and extends through December, 1997.

As risky assets, we selected the 220 US securities that have been in the S&P 500 index without interruption from January, 1978 through December, 1997. The motivation for this choice will become clear as we proceed with the empirical test.

Table I summarizes some descriptive statistics from the sample of selected risky assets compared to the S&P 500 Index.

Given our data set and the general equilibrium model developed in Section II, equation (17) implies that excess rates of return vector $\tilde{R}_t$ should satisfy

$$\tilde{R}_t = \beta_0 + \tilde{R}_{S\&P,t}\beta_{S\&P} + \tilde{R}_{M,t}\beta_M + \tilde{\epsilon}_t, \tag{18}$$

for all t; with $\tilde{R}_{M,t}$ and $\tilde{R}_{S\&P,t}$ as the excess return on the S&P 500 and US market index, respectively. As usual, we assume that residual terms $\tilde{\epsilon}_t$ are i.i.d. and betas, variances and covariances are stationary over time.

Equation (17) is in terms of expected returns. However, its implications (stated in Proposition 2) must be tested with data on month-by-month security and portfolio returns. As in Fama and MacBeth (1973), we propose the following stochastic generalization of (17):

$$\tilde{R}_t = \tilde{\gamma}_{0,t} + \tilde{\gamma}_{S\&P,t}\hat{\beta}_{S\&P,t-1} + \tilde{\gamma}_{M,t}\hat{\beta}_{M,t-1} + \tilde{\eta}_t, \tag{19}$$

[11] See *The Wall Street Journal*, March 11 of 1998.

[12] The S&P 500 Index consists of 500 stocks chosen for market size, liquidity, and industry group representation. It is a market-value weighted index, with each stock's weight in the Index proportionate to its market value. In January, 1998, industrials accounted for 76% of the companies in the Index; utilities 7.4%, financials 14.2% and transportation 2%. Over 90% of the stocks in the Index are traded on the NYSE.

with $\hat{\beta}_{M}$ and $\hat{\beta}_{S\&P}$ as the estimated market and benchmark portfolio vectors of betas, respectively.

Therefore, testing Proposition 2 implies a two-step process: first, estimating the market and benchmark betas according to equation (18); then, running cross-section regressions of stock's expected returns on the estimated betas, as stated in (19). The (monthly) time series means of $\tilde{\gamma}_{S\&P,t}$ and $\tilde{\gamma}_{M,t}$ will then be used to test whether the market, on average, rewards both systematic and *active management* risk.

More precisely, given (19), the testable implications of equation (14) expressed in Proposition 2 can be re-written as:

H1 $E\left(\tilde{\gamma}_{S\&P,t}\right) > 0$ (the cross-seccion expected excess reward on *active management risk* is positive).

H2 $E\left(\tilde{\gamma}_{S\&P,t}\right)$ is increasing in W^i, the wealth managed by institutional investors.

H3 $E\left(\tilde{\gamma}_{M,t}\right) > 0$ (a positive cross-section expected excess market risk-return trade-off).

H4 $E\left(\tilde{\gamma}_{0,t}\right) = 0$.

Before estimating $\hat{\beta}_{M}$ and $\hat{\beta}_{S\&P}$ from (18), the return on the benchmark index $\tilde{R}_{S\&P,t}$ will be replaced for (minus) the residuals from the regression of the S&P 500 on the US market index return. This residual series, $-\tilde{e}_{S\&P,t}$, will be taken as a (normalized) proxy for $\Omega\left(x_{M} - \phi_{B}\right)$, the *active management risk* defined in Section II.

After substituting for the residual series, equation (18) will change to

$$\tilde{R}_t = \beta_0 - \tilde{e}_{S\&P,t}\beta_{S\&P} + \tilde{R}_{M,t}\beta_{M} + \tilde{\epsilon}_t. \tag{20}$$

The advantage of using the residual is that, by definition, they are orthogonal to the return on the market index series and thus collinearity between both indices is totally avoided. The regression of the excess return vector $\tilde{R}_t$ on $\tilde{R}_{M,t}$ and the residuals series $-\tilde{e}_{S\&P,t}$ will then yield the required estimated vectors of market and benchmark betas.[13]

[13]The minimum least squares (MLS) estimated slope vector of benchmark betas in equation (20) is

$$\hat{\beta}_{S\&P} \quad = \quad (1-\rho^2_{M\phi})^{-1}\left(\frac{\phi'_{B}\,\Omega\, x_{M}}{\phi'_{B}\,\Omega\,\phi_{B}}\,\hat{\beta}_{M} - \frac{\phi'_{B}\,\Omega}{\phi'_{B}\,\Omega\,\phi_{B}}\right), \tag{21}$$

with $\rho_{M\phi}$ the correlation coefficient between market and benchmark portfolios. Notice that according to (19), in order to test for hypothesis H1 and H2, we should run the cross-section regressions on portfolios with a non-null $\hat{\beta}_{S\&P}$. This is the reason why we selected the subsample of assets in the S&P 500 that have remained in the index for the whole estimation and testing periods: Under the

The estimated vector of benchmark betas $\hat{\beta}_{S\&P}$ is a (normalized) measure of the *active management risk* defined in Section II. It can be shown that $-\hat{\beta}_{S\&P}$ exactly coincides with the vector of benchmark betas estimated according to (18), before replacing the return on the benchmark index for the (minus) residual series. On the other side, the estimated vector of market betas $\hat{\beta}_M$ is the usual MLS estimate in the standard CAPM model with (market) systematic risk as the only risk-factor.

III.B Methodology

The sample (1973-97) is divided in three periods: (1) January, 1973 to December, 1987, (2) January, 1978 to December, 1992 and (3) January, 1983 to December, 1997.

Within each period the sample is again divided into three more subperiods, each including five consecutive years. The first five years will constitute the *portfolio formation period*; the next five years will be the *initial estimation period*. The *testing period* will include the last five years. Table II summarizes the whole structure of divisions and subdivisions of the data sample.

In each portfolio formation period, equilibrium asset returns are assumed to satisfy (20). In the first place, ordinary least squares (OLS) regressions will be run for the 220 US risky assets with excess returns as dependent variables and market excess return and residual series as regressors.

Then, to summarize information as well as to obtain more consistent estimates of the betas, assets will be aggregated into portfolios. The criterion is first to sort all assets according to the previously estimated market index beta. After that, a relative dispersion measure (based on a moving median of the assets already incorporated into a given portfolio) will be defined for the sorted market betas; those assets with a "close" (relative to the dispersion measure) market-beta size will be simply averaged into the same portfolio. For each portfolio estimation period, the maximum difference between asset market betas in the same portfolio will be set such as to yield a final number of 10 portfolios.

Within each initial estimation period, new OLS regressions will be run with portfolio mean returns as the new dependent variables. The resulting portfolio market and benchmark (residuals) betas, together with the corresponding t-values, are presented in Table III. We also include intercept estimates and t-values.

By this procedure, estimated portfolio betas will indeed be highly correlated with real betas, resulting in a minimization of the efficiency loss inherent to the gathering process. However, correlation with measurement errors will be equally high and that leads to a decrease in the consistency of the estimated portfolio betas. A way to avoid this problem is based on non-contemporaneous beta estimates as applied by Blume

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assumption of a positive relationship between asset trading and covariance (due for instance to S&P 500 index futures trading after 1982. We thank Michael Brennan for suggesting this argument), those assets that have remained longer in the benchmark index are expected to be more correlated with it and therefore statistically different from zero.

and Friend (1973), Fama and MacBeth (1973) and Black, Jensen and Scholes (1973): Under the assumption of asset returns serially uncorrelated, measurement errors in betas calculated over non-overlapping periods should be uncorrelated as well.

Therefore, portfolio betas are themselves updated yearly through the testing period. This means that in the first testing period, for instance, the ten portfolio betas will be recomputed yearly from monthly returns from 1978 through 1983 to 1987. This should lead to more efficient estimates of the portfolio market and benchmark betas in the testing period as compared to those obtained in the initial estimation period.

This three-stage process is repeated every period in the sample. The result is a yearly time series of market and benchmark estimated betas, from 1982 through 1996. These betas will be the independent variables in regression (19): Each month, cross-section regressions of the return on the ten portfolios are run on the market and benchmark betas estimated for the previous year. The time series means of the monthly regressions slopes ($\tilde{\gamma}_{0,t}$, $\tilde{\gamma}_{M,t}$ and $\tilde{\gamma}_{S\&P,t}$) will provide standard tests on hypothesis H1 through H4. This will be analyzed in Section III.C.

III.C Analysis of the results

Table IV presents the average slope coefficients from regression (19) calculated for different time intervals within each of the three testing periods (t-values in parenthesis).

It is clear from inspection of the second column in Table V that, on average, *active management risk* is positively rewarded by the market (as predicted by hypothesis H1) only in the last testing period of the sample, from January, 1993 through December, 1997. The *active management* premium is positive and statistically different from zero (at the 5% level) from January, 1993 through 1996.[14]

These results are consistent with hypothesis H2: In the early years of the sample, institutional investors held a relatively much smaller percentage of total stocks in the market compared to the late years. Proposition 2 predicts that the expected reward to the *active management risk* should be increasing in the wealth managed by institutional investors. Therefore, this factor was expected to be significant in the final years of the sample, as results confirm.

Figure 1 plots the accumulated percentage expected reward to the *active management risk* $\tilde{\gamma}_{S\&P,t}$, from January, 1984 through December, 1997. The same graph presents the total net assets from the US stock fund industry as a percentage of the total stock market.

Thus, the empirical test seems to support the predictions derived from the objective function of the representative institutional investor proposed in our model.

On the other hand, systematic (market) risk is on average not rewarded. Throughout the sample, market risk premium is often negative and never statistically different

[14]When 1997 is added to the sample, the significance level drops to the 10%.

from zero. This contradicts hypothesis H3, which predicted a positive market risk premium. However, this result coincides with those found in other empirical papers from the literature on CAPM testing, such as Chen, Roll and Ross (1986) and Fama and French (1992).[15]

Finally, the intercept is consistently not significant, supporting the prediction of hypothesis H4.

IV Institutional investors and the home bias puzzle

The increase in transnational investments observed in the last decade has resulted in a large number of empirical studies on exchange rate behavior and portfolio selection.[16] Among the empirical regularities observed, the so called home equity bias [French and Poterba (1991), Adler and Jorion (1992), Kang and Stulz (1995) and Tesar and Werner (1995)] seems to have attracted most of the attention.

Since the early works of Grubel (1968), Levy and Sarnat (1970), Jorion (1985) and, more recently, Van Wincoop (1994) and Baxter and Jermann (1997), the potential welfare gains of international diversification have been repeatedly documented. However, domestic investor holdings of international securities are not consistent with an optimal investment strategy: Agents invest a larger proportion of their portfolio in domestic securities than would be optimal according to portfolio theory.

An equilibrium model with perfect markets and no frictions at all would yield no differences in investment opportunity sets across countries and, therefore, could not account, in principle, for the empirical regularities documented in the literature.

In order to explain this puzzle, different approaches have been suggested. In general, frictions either in consumption or in financial markets are introduced so as to separate investment opportunity sets across countries as a way to induce home biased portfolios in an equilibrium framework.

Black (1974) and Stulz (1981b), for example, introduce barriers to international capital flows in equilibrium models of international asset pricing. Uppal (1993) develops a two-country, general equilibrium model where it is costly to transfer capital across countries. This cost gives rise to endogenous deviations from the law of one price and, therefore, allows different optimal portfolios for home and foreign investors. Empirically observed portfolio allocations will nevertheless be attained only if investors had very low levels of risk aversion. A similar result is reached by Cooper and Kaplanis (1994) when they test for PPP deviations in an Adler and Dumas (1983) type of model combined with deadweight costs on foreign investment.

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[15] Comparing Table III with Table IV shows that, although the market portfolio "explains" much of the intertemporal movements in other stock portfolios (market betas $\hat{\beta}_M$ are positive and highly significant throughout the three estimation periods), their betas lack "explanatory power" in the cross-section regressions.

[16] For a survey, see Stulz (1995).

However, Tesar and Werner (1995) show that portfolio turnover rates are higher on foreign than on domestic portfolios, which seems to be at conflict with the explanation of the home bias that relies on barriers to cross-border capital mobility. Besides, they find international investment positions of institutional investors to be well below current legal limitations on foreign asset holdings of these investors.

The non-traded goods literature [Tesar (1993) and Svensson and Werner (1993)] has also examined this problem. Serrat (1996) develops a two-country, general equilibrium model with non-traded goods and complete markets. The supply of non-traded goods plays the role of an additional state variable that generates different hedging demands across countries.

Finally, Brennan and Cao (1997) and Coval (1996) present models of international equity portfolio investment flows based on differences in information between foreign and domestic investors.

Some of these arguments (cross-border investment barriers and transaction costs) seem not to be very compelling nowadays given the progressive liberalization of international capital markets and the development of new, more accessible technologies that have considerably reduced transaction costs and information gaps. Thus, it would have been reasonable to expect a considerable increase in overseas portfolio positions during the last ten years so that the puzzle would vanish. However, cross-border asset positions are still puzzlingly low according to the documented potential gains from international portfolio diversification.

This paper suggests a different approach to the home bias puzzle. Proposition 1 shows an important result of this paper: The proposed utility function (2) for the institutional investor might result in a discrepancy between her optimal portfolio and the optimal portfolio of the household. The empirical analysis in Section III supports our conjecture on the objective function of institutional investors: As predicted by Proposition 1, market rewards *active management risk* in the last years of the sample, when the percentage of total market assets managed by institutional investors is much larger.

In the present section, this result will be extended to an international framework. In a partial equilibrium setting, the behavior of the institutional investor (modeled as the risk-averse investor who is concerned with "beating" an exogenously given domestic benchmark) will be shown to induce a home bias under certain conditions on the domestic and foreign market volatilities and the covariance between domestic and foreign securities. For other equilibrium models in the international finance literature, see Solnik (1974), Sercu (1980), Stulz (1981a), Adler and Dumas (1983), Zapatero (1995) and Basak and Gallmeyer (1996).

IV.A A partial equilibrium model of international portfolio diversification

The setup will be an extension of the partial equilibrium model in Section II.A. to an open-economy framework. There are three different assets: two domestic assets and one foreign. We will denote by $\tilde{R} = (\tilde{R}_i),\ i \in \{x, y, z\}$ the vector of returns where $\tilde{R}_x$ and $\tilde{R}_y$ are the returns on the domestic securities and $\tilde{R}_z$ represents the return on the foreign security. All assets are traded in a frictionless market where unlimited short selling is allowed. We assume $\tilde{R} \sim \mathcal{N}(\mu, \Omega)$ with Ω a positive definite matrix. Investors only care about final wealth (i.e., there is no consumption at t_0). The only (domestic) consumption good in the economy will be taken as the numeraire.

Households and institutional investors are supposed to have utility functions as described in (1) and (2). We will use superscripts i and h to denote institutional investor and household, respectively. The benchmark portfolio ϕ_B in the utility function of the (representative) institutional investor will be assumed to include only domestic assets.[17] In an open-economy context, a benchmark index defined in terms of domestic securities alone (as the S&P 500 index) is justified by directly assuming a more accurate benchmark in the domestic market. In a paper on relative compensation, Zwiebel (1995) argues that "...the market has developed accurate indices to evaluate performance in the domestic stock market, while lacking good benchmarks to evaluate performance in emerging markets." Therefore, the lack of a generally accepted international benchmark justifies, in our model, the fact that managers are evaluated relative to a purely domestic benchmark, regardless of whether they invest domestically or in foreign markets.

The home bias puzzle we try to address within our model implies that holdings of international securities are smaller than holdings suggested by optimal portfolio theory for a standard investor (our household). Therefore, we want to compare the holdings of the foreign security of both investors. We will conclude that there is a home bias if the holdings of the institutional investor, arguably the "representative agent", deviate (investing a greater proportion in the domestic securities) from holdings of the representative household.

The difference between institutional investor and household optimal portfolios is expressed in equation (9).

We want to study the conditions that will yield a home equity bias in portfolio weights. Suppose first that both domestic assets have identical variance ($\sigma_x^2 = \sigma_y^2$); we also assume that the covariances between the foreign security and each of the domestic securities are identical ($\sigma_{xz} = \sigma_{yz}$). Given the simplicity of our model, these assumptions seem harmless: They will simplify the algebra to a large extent without affecting the qualitative results as it will become clear in the analysis to follow. Additionally, the presence of two domestic assets will enable us to compare the gains of within-the-country versus cross-border risk diversification.

[17] It is a linear combination of securities x and y as expressed in Section II.A.

We rewrite the difference between the proportion of initial wealth invested in the foreign security by the household and the proportion invested by the institutional investor. The result is

$$\left(\omega_z^i \quad - \quad \omega_z^h \right) = -\sigma_{mvp}^2 \, \frac{\sigma_x^2(1+\rho_{xy}) - 2\sigma_{xz}}{\sigma_z^2\sigma_x^2(1+\rho_{xy}) - 2\sigma_{xz}^2} \tag{22}$$

where ρ_{xy} represents the correlation coefficient between the domestic securities. According to our model, a home bias exists if the result of equation (22) has a negative sign. Let us define $\beta_{xz} = \sigma_{xz}/\sigma_x^2$ as the scaled (to the domestic volatility) covariance between the domestic and foreign markets.[18] In Table V we present the ranges of β_{xz} for which $\omega_z^i < \omega_z^h$ given σ_z^2, σ_{xz} and some representative values of ρ_{xy}.

See, for example, that when the domestic securities are positively and perfectly correlated (equivalent to assume the domestic market consists of only one security), the home bias arises only for high volatility of the foreign security and low β_{xz} (which means high volatility of the domestic security with respect to the covariance); for low volatility of the foreign security, there will be international bias: The institutional investor (for diversification reasons) will always invest more in the international security that the benchmark investor. On the contrary, in the case of a perfectly negative correlation between domestic assets, the home bias will arise for any value of β_{xz}: The institutional investor can attain perfect portfolio diversification within the domestic market.

The home equity bias takes place for low or high values of β_{xz}. The intuition seems to be that low values of β_{xz} imply low correlation between the domestic and the international security and then it becomes very risky to invest overseas since the chance of a large deviation from the benchmark (including only domestic securities) increases. Also, when β_{xz} is high, the covariance between the domestic and the international security is high relative to the variance of the domestic security, which only can be the result of a high variance of the international security relative to the variance of the domestic security which makes it risky to invest overseas.

The following proposition summarizes the results previously presented:

Proposition 3 *Given σ_z^2, σ_{xz} and ρ_{xy}, a home bias will exist (that is $\omega_z^i < \omega_z^h$) if and only if $\beta_{xz} = \sigma_{xz}/\sigma_x^2$ does not belong to the following intervals*

$$\begin{aligned} &\beta_{xz} \notin \left(\tfrac{1+\rho_{xy}}{2}, \tfrac{1+\rho_{xy}}{2}\tfrac{\sigma_z^2}{\sigma_{xz}}\right) \quad \textit{when } \sigma_z^2 > \sigma_{xz} > 0 \\ &\textit{or} \\ &\beta_{xz} \notin \left(\tfrac{1+\rho_{xy}}{2}\tfrac{\sigma_z^2}{\sigma_{xz}}, \tfrac{1+\rho_{xy}}{2}\right) \quad \textit{otherwise.} \end{aligned} \tag{23}$$

[18] Notice that β_{xz} is the slope of the regression of the foreign on any of the domestic assets.

We now consider the case $\sigma_z^2 = \sigma_{xz}$. It is straightforward to show that, under such an additional assumption, $\mu_{mvp} = \mu_z$ and $\sigma_{mvp}^2 = \sigma_z^2$. The difference (9) between both optimal portfolios would then be

$$\begin{pmatrix} \omega^i & - & \omega^h \end{pmatrix} = \begin{pmatrix} \phi \\ 1-\phi \\ -1 \end{pmatrix}. \tag{24}$$

The interpretation is that the institutional investor would shortsell the foreign security and reinvest the proceedings in the domestic market replicating the market index portfolio.

Finally, we consider the following case: There are two securities in the domestic market, a risky asset with return $R_x \sim N(\mu_x, \sigma_x^2)$ and a riskfree asset with return r. There is also one risky foreign security with return $R_z \sim N(\mu_z, \sigma_z^2)$. The notation is as before, but now the second component of the vector ω of weights represents investment in the domestic riskfree security. The index portfolio is formed only by the risky domestic security (equivalent to $\phi = 1$).

Under these assumptions, $\lambda^i = \lambda^h = \mu_{mvp} = r$ and the difference between both portfolios becomes

$$\begin{pmatrix} \omega^i & - & \omega^h \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix}. \tag{25}$$

The institutional investor also replicates the index portfolio, but now borrows from the domestic market at the riskfree rate r; this implies no disinvestment from the foreign market (compared to the benchmark case) and therefore $\omega_z^i = \omega_z^h$.

Therefore, given that some conditions are satisfied, an institutional investor whose utility function is as stated above will optimally invest a smaller proportion of the portfolio in foreign securities than an individual investor who maximizes expected utility over final wealth.

V Conclusions

This paper postulates that management performance evaluation is a source of divergence between institutional investor and household optimal portfolio decisions. In a partial equilibrium setting, the objective of a representative household is modeled as the maximization of expected utility (an increasing and concave function, in order to accommodate risk aversion) of final wealth. In the spirit of Brennan (1993), the institutional investor is assumed to maximize utility (same type of function) of final wealth minus a benchmark.

Under these assumptions, the optimal portfolio choices of both types of investors are derived and compared. The specific objective function of the representative institutional investor is shown to induce a divergence between her optimal portfolio and that of the representative household.

We study the effects of this optimal strategy in asset trading on a simple one-period equilibrium model and obtain a multibeta CAPM; as a novelty, a new factor-risk is brought into the analysis: the *active management risk*. This new beta is defined as the normalized (to the benchmark's variance) covariance between an asset's excess return and the excess return of the market over the benchmark index.

Two main conclusions are drawn from the equilibrium. First, expected reward to the *active management risk* is positive. Additionally, it is increasing in the size of the domestic wealth managed by active institutional investors. Second, empirical support of the postulated objective function for the institutional investor results in a violation of the market efficiency hypothesis.

We tested this model using a data sample of 220 US securities and the S&P 500 as the benchmark index. The sample consists on monthly returns from January, 1973 through December, 1997. We show that the index is relevant in order to explain the excess return of domestic securities. The test supports the predictions of the model. The expected reward to the *active management risk* is positive and statistically different from zero in the last five years of the sample, when the percentage of total assets market managed by institutional investors rose markedly.

As an extension of the previous results to an international framework, the model was shown to provide an alternative explanation of the home bias puzzle. In a partial equilibrium setting, the specific objective function of the representative institutional investor induces a home bias in her portfolio. The bias obtains for certain (and plausible) combinations of the volatilities of domestic and foreign asset markets and the covariances between the domestic and international securities.

VI References

Adler, M. and B. Dumas (1983) "International portfolio choice and corporation finance: A synthesis," *Journal of Finance* 38, 925-984.

Adler, M. and P. Jorion (1992) "Universal currency hedges for global portfolios," *Journal of Portfolio Management* 18, 28-35.

Admati, A. and S. Ross (1985) "Measuring investment performance in a rational expectations equilibrium model," Journal of Business 58, 1-26.

Admati, A., S. Bhattacharya, P. Pfleiderer and S. Ross (1986) "On timing and selectivity," *Journal of Finance* 41, 715-729.

Admati, A. and P. Pfleiderer (1997) "Does it all add up? Benchmarks and the compensation of active managers," *Journal of Business* 70, 323-351.

Allen, F. (1990) "The market of information and the origin of financial intermedation," *Journal of Financial Intermedation* 1, 3-30.

Bhattacharya, S. and P. Pfleiderer (1985) "Delegated Portfolio Management," *Journal of Economic Theory* 36, 1-25.

Basak, S. and M. Gallmeyer (1996) "Currency prices, the nominal exchange rate, and security prices in a two country dyamic monetary equilibrium," Working Paper, Wharton School of Business.

Baxter, M. and J. Jermann (1997) "The international diversification puzzle is worse than you think," *American Economic Review* 87, 170-180.

Black, F. (1974) "International capital market equilibrium with investment barriers," *Journal of Financial Economics* 1, 337-352.

Black, F., M. Jensen and M. Scholes (1973) "The Capital Asset Pricing Model: Some empirical tests," Studies in the Theory of Capital Markets, Edited by M. Jensen. Praeger. New York.

Blume, M. and I. Friend (1973) "A new look at the Capital Asset Pricing Model," *Journal of Finance* 28, 19-33.

Brennan, M. (1993) "Agency and asset pricing," Working Paper no. 6-93. UCLA-Anderson Graduate School of Management.

Brennan, M. (1995) "The individual investor," *The Journal of Financial Research* 1, 59-74.

Brennan, M. and H. Cao (1997) "International portfolio investment flows," *Journal of Finance* 52, 1851-1880.

Chen, N., R. Roll and S Ross (1986) "Economic forces and the stock market," *Journal of Business* 59, 383-403.

Cooper, I.A. and E. Kaplanis (1994) "Home bias in equity portfolios, inflation hedging and International Capital Market Equilibrium," *Review of Financial Studies* 7, 45-60.

Coval, J.D. (1997) "International capital flows when investors have local information" Working Paper, *University of Michigan Business School*.

Del Guercio, D. and P. Tkac (1998) "The determinants of the low of funds of managed portfolios: Mutual funds versus pension funds" Mimeo, University of Oregon.

Dhillon, U. and H. Johnson (1991) "Changes in the Standar and Poor's 500 List," *Journal of Business* 64, 75-85.

Dybvig, P. and S. Ross (1985) "Differential informaton and performance measurement using a security market line," *Journal of Finance* 40, 383-399.

Fama, E. and J. MacBeth (1973) "Risk, return and equilibrium: Empirical tests," *Journal of Political Economy* 81, 607-636.

Fama, E. and K. French (1992) "The cross-section expected stock returns," *Journal of Finance* 47, 427-465.

French, K.R. and J.M. Poterba (1991) "International diversification and international equity capital flows," *American Economic Review* 81, 222-226.

Grinblatt M. and S. Titman (1989) "Portfolio performance evaluation: Old issues and new insights," *Review of Financial Studies* 3, 393-421.

Grubel, H. (1968) "Internationally diversified portfolios," *American Economic Review* 58, 1299-1314.

Gruber, M. (1996) "Another puzzle: the growth in actively managed mutual funds," *Journal of Finance* 51, 783-810.

Harris, L. and E. Gurel (1986) "Price and volume effects associated with changes in the S&P 500 list: new evidence for the existence of price pressures," *Journal of Finance* 41, 815-829.

Heinkel, R. and N. Stoughton (1994) "The dynamics of portfolio management contracts," *Review of Financial Studies* 7, 351-387.

Jorion, P. (1985) "International portfolio diversification with estimation risk," *Journal of Business* 58, 259-278.

Kang, J.K. and R.M. Stulz (1995) "Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan," Working Paper, Ohio State University.

Lakonishok J, A. Shleifer and R. Vishny (1992a) "The impact of institutional trading on stock prices," *Journal of Financial Economics* 32, 23-43.

Lakonishok J, A. Shleifer and R. Vishny (1992b) "The structure and performance of the money management industry," Brookings Papers: Microeconomics 1992.

Levy, H. and M. Sarnat (1970) "International diversification of investment portfolios," *American Economic Review* 50, 668-675.

Lynch, A. and R. Mendenhall (1997) "New evidence on stock price effects associated with changes in the S&P 500 index," *Journal of Business* 70, 351-383.

Merton (1973), R. "An intertemporal capital asset pricing model," *Econometrica* 41, 867-887.

Serrat, A. (1996) "A Dynamic Equilibrium Model of International Risk-Sharing Puzzles," Working Paper, University of Chicago.

Sercu, P. (1980) "A generalization of the international asset pricing model," *Revue de L'Association Francaise de Finance* 1, 91-135.

Shleifer, A. (1986) "Do demand curves for stocks slope down?," *Journal of Finance* 41, 579-590.

Sirri, E.R. and P. Tufano (1993) "Competition and change in the mutual fund industry," Financial Services: Perspectives and Challenges, Samuel L. Hayes Ed.

Sirri, E.R. and P. Tufano (1997) "Buying and selling mutual funds: Flows, performance, fees, and services," Harvard Business School Working Paper 93-017.

Solnik, B. (1974) "An equilibrium model of the international capital market," *Journal of Economic Theory* 8, 500-524.

Stoughton, N. (1993) "Moral Hazard and the Portfolio Management Problem," *Journal of Finance* 48, 2009-2028.

Stulz, R. (1981a) "A model of international asset pricing," *Journal of Financial Economics* 9, 383-406.

Stulz, R. (1981b) "On the effects of barriers to international investment," *Journal of Finance* 36, 923-934.

Stulz, R. (1995) "International portfolio choice and asset pricing: An integrative survey," *Handbooks in OR & MS.* Edited by R. Jarrow et al. Elsevier Science B.V.

Svensson, L.E.O. and I. Werner (1993) "Nontraded assets in incomplete markets," *European Economic Review* 37, 1149-1168.

Tesar, L. (1993) "International risk- sharing and nontraded goods," *Journal of International Economics* 35, 69-89.

Tesar, L. and I. Werner (1995) "Home bias and high turnover," *Journal of International Money and Finance* 14, 467-492.

Uppal R. (1993) "A general equilibrium model of international portfolio choice," *Journal of Finance* 48, 529-554.

Van Wincoop, E. (1994) "Welfare gains from international diversification," *Journal of Monetary Economics* 34, 175-200.

Zapatero, F. (1995) "Equilibrium asset prices and exchange rates," *Journal of Economic Dynamics and Control* 19, 787-811.

Zwiebel, J. (1995) "Corporate conservatism and relative compensation," *Journal of Political Economy* 103, 1-25.

TABLE I
Risky Assets Sample and S&P 500 Statistics
(millions of US dollars)

	Assets sample	S&P 500
Total Market value	4,528 $\times 10^3$	7,657 $\times 10^3$
Mean Market Value	21,060	15,313
Median Market Value	8,805	6,905
Largest Company's Market Value	243,300	253,636
Smallest Company's Market Value	535	430

Note: Data as of January 1998.

TABLE II
Portfolio Formation, Initial Estimation
and Testing Periods

	Periods		
	1	2	3
Porfolio formation period	1973-77	1978-82	1983-87
Initial estimation period	1978-82	1983-87	1988-92
Testing period	1983-87	1988-92	1993-97

TABLE III
Intercept, market and benchmark betas

$$\tilde{R}_t = \beta_0 + \tilde{e}_{S\&P,t}\beta_{S\&P} + \tilde{R}_{M,t}\beta_M + \tilde{\epsilon}_t$$

Statistic	1	2	3	4	5
	Portfolios for Estimation Period 1978-82				
$\hat{\beta}_0$	0.004	0.0001	0.002	0.003	0.005
t($\hat{\beta}_0$)	1.142	0.074	0.974	1.244	1.649
$\hat{\beta}_{S\&P}$	-4.291	0.768	1.196	3.170	2.659
t($\hat{\beta}_{S\&P}$)	-4.797	2.051	2.280	5.811	3.616
$\hat{\beta}_M$	0.925	0.863	1.133	1.148	1.246
t($\hat{\beta}_M$)	10.854	24.207	22.668	22.092	17.782
	Portfolios for Estimation Period 1983-87				
$\hat{\beta}_0$	0.005	0.002	0.005	0.000	0.002
t($\hat{\beta}_0$)	1.349	0.478	2.576	-0.093	0.858
$\hat{\beta}_{S\&P}$	3.042	2.804	-0.734	-0.495	-1.062
t($\hat{\beta}_{S\&P}$)	3.134	3.204	-1.492	-1.078	-1.750
$\hat{\beta}_M$	0.492	0.577	0.938	1.087	1.215
t($\hat{\beta}_M$)	6.890	8.978	25.943	32.174	27.238
	Portfolios for Estimation Period 1989-92				
$\hat{\beta}_0$	0.001	-0.002	0.004	0.001	-0.003
t($\hat{\beta}_0$)	0.162	-0.727	2.434	0.879	-0.875
$\hat{\beta}_{S\&P}$	-2.728	-1.627	-0.868	-0.557	0.598
t($\hat{\beta}_{S\&P}$)	-2.642	-1.815	-2.183	-1.445	0.741
$\hat{\beta}_M$	0.381	0.446	0.868	1.115	1.300
t($\hat{\beta}_M$)	3.773	5.091	22.344	29.604	16.466

TABLE III (*Continued*)
Intercept, market and benchmark betas

$$\tilde{R}_t = \beta_0 + \tilde{e}_{S\&P,t}\beta_{S\&P} + \tilde{R}_{M,t}\beta_M + \tilde{\epsilon}_t$$

Statistic	6	7	8	9	10
	Portfolios for Estimation Period 1978-82				
$\hat{\beta}_0$	0.005	0.009	0.023	0.018	0.029
t($\hat{\beta}_0$)	1.369	2.215	2.351	3.139	2.642
$\hat{\beta}_{S\&P}$	5.009	2.844	0.725	0.673	0.565
t($\hat{\beta}_{S\&P}$)	5.056	2.709	0.291	0.453	0.200
$\hat{\beta}_M$	1.361	1.521	1.202	1.847	2.072
t($\hat{\beta}_M$)	14.424	15.211	5.062	13.069	7.706
	Portfolios for Estimation Period 1983-87				
$\hat{\beta}_0$	-0.0004	0.0001	-0.0001	-0.009	0.008
t($\hat{\beta}_0$)	-0.128	0.028	-0.012	-1.868	0.561
$\hat{\beta}_{S\&P}$	-1.241	-0.486	-0.635	0.714	12.320
t($\hat{\beta}_{S\&P}$)	-1.592	-0.566	-0.519	0.517	3.158
$\hat{\beta}_M$	1.252	1.338	1.194	1.185	1.283
t($\hat{\beta}_M$)	21.849	21.174	13.271	11.676	4.472
	Portfolios for Estimation Period 1989-92				
$\hat{\beta}_0$	-0.003	0.001	-0.004	-0.002	-0.018
t($\hat{\beta}_0$)	-0.701	0.285	-0.329	-0.152	-1.087
$\hat{\beta}_{S\&P}$	1.199	1.422	6.128	6.909	-0.309
t($\hat{\beta}_{S\&P}$)	1.135	1.301	1.751	2.217	-0.068
$\hat{\beta}_M$	1.329	1.515	1.149	1.791	1.238
t($\hat{\beta}_M$)	12.855	14.169	3.360	5.878	2.796

TABLE IV
Average slope coefficients ($\times 100$)

$$\tilde{R}_t = \tilde{\gamma}_{0,t} + \tilde{\gamma}_{S\&P,t}\hat{\beta}_{S\&P,t-1} + \tilde{\gamma}_{M,t}\hat{\beta}_{M,t-1} + \tilde{\eta}_t$$

	$\bar{\tilde{\gamma}}_{0,t}$	$\bar{\tilde{\gamma}}_{S\&P,t}$	$\bar{\tilde{\gamma}}_{M,t}$
	Testing Period 1983-87		
1983	0.256	-0.119	1.093
	(0.132)	(0.531)	(0.546)
1983-84	1.077	-0.037	-0.719
	(0.865)	(0.288)	(0.536)
1983-85	1.325	0.067	-0.732
	(1.506)	(0.676)	(0.763)
1983-86	1.496	0.116	-0.697
	(1.853)	(1.243)	(0.832)
1983-87	1.114	0.067	-0.620
	(1.367)	(0.827)	(0.742)
	Testing Period 1988-92		
1988	-0.675	-0.023	1.687
	(0.433)	(0.119)	(0.817)
1988-89	0.533	-0.009	0.595
	(0.533)	(0.072)	(0.459)
1988-90	0.498	-0.011	-0.320
	(0.467)	(0.109)	(0.233)
1988-91	0.358	-0.025	-0.012
	(0.405)	(0.312)	(0.010)
1988-92	0.141	-0.037	0.412
	(0.179)	(0.501)	(0.412)
	Testing Period 1993-97		
1993	2.476	0.574	-1.190
	(1.806)	(2.484)	(0.901)
1993-94	0.745	0.334	-0.642
	(0.728)	(2.001)	(0.645)
1993-95	0.778	0.250	-0.300
	(1.004)	(1.649)	(0.375)
1993-96	0.745	0.277	-0.148
	(0.995)	(2.133)	(0.198)
1993-97	0.418	0.177	0.448
	(0.633)	(1.405)	(0.650)

Note: t-values in parenthesis.

Table V
Values of β_{xz} that yield a Home Bias

	$\sigma_z^2 > \sigma_{xz} > 0$		$\sigma_z^2 < \sigma_{xz}$
$\rho_{xy} = -1$		$\omega_z^i < \omega_z^h \; \forall \beta_{xz} \in \Re_{++}$	
$\rho_{xy} = 0$	$\beta_{xz} \notin \left(\frac{1}{2}, \frac{\sigma_z^2}{2\sigma_{xz}}\right)$		$\beta_{xz} \notin \left(\frac{\sigma_z^2}{2\sigma_{xz}}, \frac{1}{2}\right)$
$\rho_{xy} = 1$	$\beta_{xz} < 1$		$\omega_z^i > \omega_z^h \; \forall \, \beta_{xz} \in \Re_{++}$