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WHEN THE GOVERNMENT IS EXPERIMENTING: FIELD STUDY ON HOUSEHOLDS' BEHAVIOR

IDO KALLIR[*] AND AHARON (RONI) OFER[**]

Abstract

When households make financial decisions, one may expect them to be both informative and rational—just as any other financial agent. In this paper, we question whether this hypothesis is error-free and correct by using a unique large-scale event study. Our results do not support the axioms of financial theory. However, our results are harmonious with the experimental literature, which, to be sure, suggests that agents use information inefficiently; they ignore it or misuse to the effect of bringing about suboptimal or even bad financial results. We use a unique event—an entirely new valuation mechanism that was "enforced" on the pension system and on the households—in order to study the behavior of individual investors. We find that under actual conditions—more similar to "real life" than any deliberated and designed experiment can give rise to—and while information and time are abundant, investors do not behave as if they are informed and rational. They behave in this uninformed and irrational way regardless of the availability of information and the clear-cut possibility of utility-maximizing decision-making. Only when agents are provided with direct information and when the detailed consequence is analyzed for them, do households make a rational decision. We suggest that the gap between experimental conditions and actual situations may be the reason for the indecisive results appearing in the current experimental literature.

Key Words:

Pension Funds, Flow of Funds, Household Decision, Personal Finance, Household Behavior, Family Economics

JEL: D1, D78, D83, G14, G23, G28

[*] The Graduate School of Business, Ono College, Israel. Corresponding author: ikallir@gmail.com
[**] The Graduate School of Business, Tel Aviv University, Tel Aviv, Israel. ronio@tauex.tau.ac.il

A. INTRODUCTION

As any other financial agent, private investors are expected to be both rational and informative when they make financial decisions. We question whether this fundamental hypothesis is correct. The uniqueness and distinction of this critical study lies in the fact that we test this hypothesis by relying on a unique large-scale event study rather than on experiments. Our results do not support the fundamental axioms of financial theory. Over the past 30 years only few studies provide empirical evidence of the financial behavior of household agents. While financial theory axioms have been questioned repeatedly both in theoretical and experimental findings, the majority of the critical findings and notes are based on experiments. The behavior of individuals has always held a fascination for financial researchers. Rational behavior is a financial theory axiom. Since the surge in behavioral finance literature, it has also been a cause for debate. If decision-makers' actions do not bear out even the most basic tenets of the classic theory, how much can one count on the predictions of such a questionable theory?

The measurement of manifold techniques has raised even more debate. Current experimental literature suggests that financial agents use information inefficiently, either by ignoring it or by using it in a financially destructive manner. We use a unique event, an entirely new valuation mechanism that was "enforced" on the pension system, and therefore on the households, in order to study the behavior of individual investors. We find that under representational and true–to-life conditions, when information and time are in abundance, investors do not behave as if they are informed and rational—though information is available and the possibility of utility-maximizing decision-making is cut and dry. Only when agents are provided with direct information and when the detailed consequences are analyzed for them, do households beget a rational decision.

Our motivation is derived from the unique setting. Events are rare tools when studying finance. We use a one-time financial adjustment measure executed by the regulator as a large-scale field experiment. It allows us to test some fundamental hypotheses in "real life" conditions. Our objective is to track the activities of pension funds' investors, while trying to find the conditions under which the household agents make the right (i.e. financially wise) decision. With the appropriate reservations, which stem from the methodology of the unique event, the question can be boldly put as follows: Do households make rational and informative financial decisions?

The rest of the article is organized as follows: In the next section, we discuss how our article is to be seen and judged in the context of related literature. In Section 3, we describe the event's setting, the data and screening considerations. In Section 4, we provide our main empirical analysis. In Section 5 we present our results. We conclude in Section 6.

B. LITERATURE REVIEW

At first glance it seems that the segments of managed money attributed to mutual funds and pension funds are similar in many ways. Given these prima facie similarities between the two types of assets and managers, we might expect them to have similar incentive mechanisms and clientele reactions to performance and fund flow. While there is extensive literature concerning the performance and behavior of the managers of the mutual funds, much less is known regarding the mangers of the pension funds. Edelen (1999), Del Guercio and Tkac (2002), and Grinblatt and Titman (1989), show that the Flow of Funds (FoF) of mutual funds is strongly related to unadjusted raw return. The flow is unrelated to tracking error.1 Sirri and Tufano (1998) claim that the flow's performance relations in the mutual fund industry are convex: "Mutual fund consumers chase returns, flocking to funds with the highest recent returns, though failing to flee from poor performers." Mutual fund managers appear to get large rewards for posting high returns, yet little penalty even for extreme underperformance.

Del Guercio and Tkac (2002) show that there is a strong relationship between the FoF and Jensen's Alpha. This result may be consistent with the empirical findings appearing in previous publications, but it is somewhat surprising: Edelen's (1999) survey results show that mutual fund investors do not use risk-adjusted performance measures when evaluating funds. Del Guercio and Tkac (2002) provide evidence that the strong statistical relationship between Jensen's Alpha and the mutual fund flow is due to the high correlation between Alpha and the widely available Morningstar's ratings. When they added Morningstar's ratings as an explanatory variable to the regression, Alpha was no longer significant. The information is reflected not in prices, but rather in the demand for fund units. Del Guercio and Tkac (2008) present empirical data which show that the determinant of the FoF of mutual funds differs essentially from the FoF of pension funds. Pension funds' FoF is positively related to risk-adjusted performance measures such as Alpha and negatively related to tracking error. Pension fund managers are not over-rewarded by investors for raw return. The investors' perceptions regarding mutual funds differ significantly from that of pension funds—compare Sirri and Tufano's (1998) well-cited results to those of Del Guercio and Tkac (2008).2 As a rule, price is the chosen component for testing efficiency. We suggest that efficiency might also be tested by volume. Berreda et al. (2005) simulate an economy where efficiency is measured by volumes, as distinguished from prices. Investors react to data sets, which are based only on one plausible conclusion; rationality is

[1] When using indexing or any other benchmarking strategy, the performance of the portfolio differs from that of the benchmark. In reality, no indexing strategy can perfectly match the performance of the index or benchmark. The tracking error quantifies the degree to which the strategy differs from the index or benchmark.

[2] In our work the average investment strategy resembles investment in mutual funds, not in pension or provident funds. Investors consider raw return more than risk-adjusted return as a plausible explanation for why that information is not freely available, as was the raw return data. In contrast, past performance and raw return performance have been available on the Web for several years.

insufficient. The information set that fits the semi-strong efficient-market hypothesis (EMH) is mandatory in order to make investors consider their next steps.

A considerable body of literature deals with the extent to which agents can derive rents from information (Osband, 1989), or are willing to pay for it (Porter, 1995). According to Camerer et al. (1989), and quite ironically, this can be seen as rather "the curse of knowledge", the more people know, the lower the quality of their decision. Insensitivity to information regarding distributions of assets in portfolio selection problems is documented in the experiments of Kroll et al. (1988) and of Anderson and Settle (1996). The latter suggest that agents neglect "sophisticated" information and tend to strongly respond to simple information, such as raw return. This result can be termed as irrational financial decision-making. By using the terms of the Prospect Theory, Kahneman and Tversky (1980) show in their experiment that investors who are given a simple set of choices—a lottery with up to three outcomes—maximize an S-shaped value function. Shefrin and Statman (1985) conclude from the experimental information that "Under Prospect Theory, investors display a tendency to make certain financial decisions even when standard theory (EU) suggests otherwise".

C. THE EVENT

From January to March 2005, we witnessed a significant and unexpected slowdown in FoF. It was a compressive phenomenon—from vintage provident funds to privately owned provident funds. In April 2005, this trend reversed completely, and the compensation was far larger than the loss of funds. What was the cause for this dramatic turn-over?

The outgoing of FoF from vintage funds had started in the late 1990s and rapidly increased through 2003 and 2004. Figure A (see Appendix) show the trend of the FoF from January 2002 until December 2006. It is easy to spot the "glitch" of April 2005: The April 2005 total net negative endowment of 160 million dollars is comprised of 375 million dollars of negative endowment in the banking sector funds and 235 million dollars of positive endowment in the private sector3 funds. The trend itself does not change after April 2005: The banking sector continues to bleed, especially the large banking sector, while the private sector harvests the lion's share of the flow.

When using the concept of Fair Value (FV), fixed-income assets—such as loans and bonds—are valued by employing a flow of synthetic zero coupon bonds, which are derived from the Nelson-Siegel model. We compute both the Fair Value and the Accrued Value of 39 portfolios, which were held by various provident funds on December 31st, 2004. The difference in valuation between the two models is significant and positive. The average difference is equal to 5.6 percent per NTR portfolio and to 1.2 percent for the average total portfolio, as the average rate of NTR amounted to 20 percent of the portfolio.

[3] The residual sum is of funds managed by unions and corporations.

The delay of a re-investment decision from a point in time up to 90 days prior to April 1st, 2005, adds an average 1.2 percent risk-free return. The return is risk-free, because it is contingent upon a pure revaluation of a past performance. We show that, at the very minimum, the information became available to few households before April 1st, 2005. We also show that there is a significant number of households that made a decision to move from a vintage fund to a novel fund, and that they were also willing to delay the actual action in order to gain a risk-free return. The hold-up decisions can be explained by a series of variables that illuminate how individual investors make their decisions.

In order to make the case more plausible, let us assume the following simple scheme: A median investor of a typical vintage fund holds NIS 180,000 (about $50,000) worth of investments (Fund A). This fund contains a portfolio which contains 25 percent nontradable assets. Following the expected change, the fund's total value increases by 1.64 percent. Now let us assume that this depositor has made a decision (for reasons external to our model) to shift her savings from Fund A to a privately owned novel fund (Fund B). Fund B has only 5 percent nontradable assets, and accordingly, the parallel average change in valuation is only 0.32 percent.

Now, let us assume that this investor made her decision on March 31st, 2005, and that the shift could have been made instantly the next day. If she was informed that a change in the valuation mechanism is going to occur, and nevertheless, she was willing to wait (e.g. make the shift a day later), she would have immediately won a risk-free and tax-free reward of nearly $680 for delaying her decision by only one day. Under similar conditions, an informed and rational investor would have decided to postpone the shift of funds.

1. Timeline

"Current arrangements for pensions in Israel suffer from numerous problems and shortcomings."

— Bank of Israel Annual Report, 2002

During 2004, the Commissioner of Capital Markets, Insurance and Savings at the Ministry of Finance issued an RFB for the implementation of a practical Fair Value model. This model was to employ the mandatory valuation technique of all Nontradable Assets (NTR) on the portfolios of the long-term savings funds: pension funds, life insurance policies, and provident funds. In August 2004, an SPC named Shearei Ribit (www.rbt.co.il, hereinafter: "RBT"), sponsored by Global S&P, won the bid. RBT submitted the Nelson-Siegel (1987) model, mainly due to its robustness in relation with small data sets. RBT had started testing the model in early October 2004, using sample portfolios. RBT's analysis for all the test portfolios produced similar results: Executing the FV model—if rates do not sharply and unexpectedly rise in a three-month period by more than 200bp—would significantly increase the value of NTR in all funds, depending on their actual mix and the rate of NTR. On November 22nd, 2004, RBT had presented the model and the results to the market's professionals. The audience was composed of 250 pension and provident fund investment managers. The model was scheduled to launch on January 1st, 2005; its date of implementation was made public. By December 15th, 2004, technical difficulties and political pressure caused the Ministry of Finance to postpone the model's launch to April

2nd, 2005—i.e. three months later. This delay was also brought to the knowledge of the public by both the popular and professional media.

During the ensuing four-month period (December 2004 until March 2005), a debate arose between the Ministry of Finance and the market players. The debate zeroed in on the need for overall fair value modeling, as well as on some of the specific characteristics and anticipated effects—including the effects of revaluation of respective funds. This debate also became public, as both pro and con views were published in the financial media. We define "direct" as *an information set that fits the semi-strong efficiency hypothesis* (Jensen, 1978). In order to support the hypothesis of information availability, we take two investigative steps:

1. A survey of the daily financial media, including the electronic media[4], for the period between November 2004 and March 2005. We find 17 articles and 36 quotes on the expected revaluation launch. The coverage was comprehensive enough that it encompassed 100 percent of the media. At least two articles in the form and purpose of "Tips for the Investor" had advised potential investors to postpone their pension-related decisions until after April 1st.

2. A survey of the instructions and information that was provided to investment consultants in the provident funds that were owned at the time by banks. During the process of switching funds, bankers had the opportunity to intervene in the process in almost 100 percent of the cases—either passively (if consulted by the households) or actively. Usually the same banker (or at most a branch of the bank) handles all household financial services, from credit cards to investments.

We find that at six out of the eight banks operating in Israel, a series of steps were taken to slow the flow, even temporarily. These courses of action included, *inter alia,* handouts and lectures to the consultants who work with households. In three of the six banks, instructions were issued to ask investors who submitted a withdrawal request to arrange meetings with the bank's consultants, so as to assure that information was passed on. The decision to delay the fund withdrawal, even for a short period, is a win-win situation from the bank's point of view. The bank wins the investor's fee for at least another period, while it is indifferent to the question how the value of the portfolio is divided among its clientele. Some of the investors would delay the withdrawal for more than a few months. The "losers" are the investors who did not plan to withdraw their funds at all. Given the four-month period of available information and the two sources described, we deduce that the *individual investor* had substantial information—either from the media or through a professional network (Watts and Strogatz, 1998)[5]—of a significant expected change in the valuation of the provident fund. The quantity and quality of information satisfies the Semi-Strong EMH.

[4] Four daily newspapers, including an economic daily were published in Israel. In addition, there are several popular finance-oriented Web sites.

[5] The Watts and Strogatz (1998) model is a random graph generation model that produces graphs with small-world properties, including short average path lengths and high clustering. The model was designed as the simplest possible model that addresses clustering while retaining the short average path lengths.

2. The Provident Fund Market

Until the middle of the 1990s, the provident fund market was controlled by two segments: (a) the unions—via organized employment constituencies, including municipalities and transportation cooperatives; and (b) the banks. The latter had used the low level of competition to create links between retail banking services and financial services, e.g. provident funds. For many people, having an account at a certain bank meant "automatically" having one or more provident fund accounts at the same bank.

In 1993, private brokerage houses started providing additional financial services, such as provident funds. In January 2002 the private funds, including those held by insurance companies, held only NIS 4.2 billion of the NIS 167 billion market. The growing awareness of performance and regulation, together with intense media campaigns, brought about a change. By 2005, the private funds had assets under their management totaling NIS 19 billion out of the total NIS 226 billion market (see Figure B). The trend, then, was to transfer existing funds from the banks, especially from the three largest ones, to the private sector. The trend was supported by substantial and straightforward financial data that the investors were slow to perceive at the time: The private funds' yields were higher than those of the banks. For instance, in the year 2000, sixteen of the top twenty performing funds were private.6

3. Implementation: Nelson-Siegel Model

The Nelson-Siegel model (1987) is used extensively by central banks[7] all over the world, in order to estimate term structure and yields. The model links an exponential approximation of the discount rate function directly to bond prices with a pre-specified functional form. The instantaneous forward rates at maturity which are modeled as the solution for the second-order differential equation with equal roots, is:

$$f(n) = \beta_0 + \beta_1 \exp(-\alpha n) + \alpha n \beta_2 \exp(-\alpha n) \qquad (C.1)$$

Equation C.1 implies that the discount function $P(n)$ is double-exponential:

$$P(n) = \exp[-\beta_0 + (\beta_1 + \beta_2)(1 - \frac{\exp(-\alpha n)}{\alpha} - n\beta_2 \exp(-\alpha n)] \qquad (C.2)$$

This specification generates forward rates and yield curves with a desirable range of shapes—including upward sloping— and possibly also upturning and hump-shaped. The Nelson-Siegel model was chosen by the tender committee for its robustness in the context

[6] The union sector is stable. One main reason for this is that employees (e.g. teachers) are required to allocate their investments into special funds that apply for the specific union only. We therefore remove these funds from the database.

[7] See BIS 25 at http://www.bis.org/forum/research.htm for a full list and a description of the Nelson-Siegel model around the globe.

of poor statistical environments with relatively small samples, quite in keeping with the Israeli case. For a specific curve only, four parameters must be determined in order to fit the Nelson-Siegel term structure model. The model defines the four factors as follows: α represents the level at the beginning of the curve, or the short one-day rate; β_0 represents the slope, or the long-term rate; $\beta_1$and β_2 determine the magnitude and direction of the hump-curvature.

The local market requires some other adjustments. Over the years, most long-term debt was issued as sovereign bonds, fully indexed to the CPI (Consumer Price Index). Firms followed, because they also issued most of their bonds as CPI-indexed. Fifty-eight percent of the national debt is CPI-indexed, with the rest divided between US dollar-linked bonds and unindexed bonds. For each of these three categories, we estimate spread curves for the sovereign (RF) bonds and for the corporate bonds. The parameters are estimated by using the OLS procedure. Once the parameters are set, a simulation generator sets the initial parameters and the actual term structure is created. Figure D provides an example of the information supplied to qualified investors. The same technique was used for each category (CPI-indexed, US dollar-linked, and unlinked) of government bonds and corporate ratings (AAA to non-rated bonds), while using the ratings of local affiliations of S&P and Moody's.

Fair value, or fair price, is defined by the Financial Accounting Standards Board (FASB) as "a rational and unbiased estimate of the potential market price of a good, service, or asset, taking into account such factors as relative scarcity, perceived utility, potential risk, return properties, replacement costs, or costs of close substitutes and production and distribution costs, including cost of capital." There are two schools of thought that deal with the relationship between market price and fair value, applying their theories, by and large, to any kind of market, but particularly to tradable assets. The efficient market hypothesis asserts that in an organized and reasonably transparent market, the market price is generally equal or close to the fair value. The reason for this is that investors react quickly to the effect of incorporating new information on relative scarcity, utility or potential returns in their bids. The behavioral finance hypothesis asserts that market price often diverges from the fair value due to various and not uncommon cognitive biases among buyers or sellers. However, even the proponents of the behavioral finance hypothesis generally acknowledge that behavioral anomalies, which may cause such a divergence, are often erratic and unpredictable, chaotic or otherwise too perplexing in order to be captured and incorporated into a sustainable profitable trading strategy—especially when accounting for transaction costs.

FASB offers guidance as to how entities should determine fair value estimates for the purpose of financial reporting. FASB's draft suggests the following definition of fair value: "The price at which an asset or liability could be exchanged in a current transaction between knowledgeable, unrelated, willing parties." The draft notes that in the absence of an actual exchange, the price is but an estimate. FASB's guidelines emphasize the importance of using market inputs when valuing an asset or a liability. The inputs of a specific market, which are mentioned here, include: quoted prices, interest rates, yield curve and credit data. Fair value is derived by definition from a current transaction that

occurs in an active market between knowledgeable and unrelated parties. When fair value is not available, due to the nonexistence of an actual transaction, it is logical to use information from an active market.

The expected effect of the Fair Value Model is equal to the difference between the fair value and the accrued value for each nontradable bond in the portfolio. Equation C.3 sets the net change in value for any portfolio **i**:

$$\Delta V_i = \sum_{j=1}^{J} FV_j - AV_j \qquad (C.3)$$

Each and every fund holds its own portfolio, a differing mix of bonds. The actual valuation of the difference is unique to each fund and depends on the characteristics of its specific portfolio. The AV method is straightforward: The value of the bond is its expected payoffs as discounted by the yield calculated at its offering. The value of a regular coupon bond rises slowly as the coupon payment comes near, and then it drops. The price is fixed in relation to changes in the market rate. Assuming that the bond will pay its obligation, the AV is a simple set of expected payments. Once a bond is added to the portfolio, its value is fixed and riveted. It is abundantly clear that any FV model that uses market-to-market methodology of any kind would add volatility into the valuation mechanism, which was overlooked and neglected previously. It can also be concluded that if rates have changed since the bond was purchased, and the FV model recomputes the value of the bond, a difference in valuation is to be expected.

The real rate in April 2005 was the lowest point ever—3.6 percent following a series of rate cuts during most of 2003 and 2004. It had normally ranged between 6 and 8 percent. Between August and October 2003, the rates followed a strictly declining pattern (see Figure C).

Historically, most of the debt in Israel has been CPI-indexed. Though this is gradually changing, by 2005, 95 percent of corporate debt and 82 percent of government debt (excluding one-year notes) were in CPI-indexed bonds.

D. ANALYSIS

We analyze 39 actual portfolios that were held by the provident funds on December 31st, 2004. We use the adjusted Nelson-Siegel (21987) valuation model on each portfolio in order to receive a specific valuation. Each portfolio is the one reported by each fund in a specific week between November 2004 and March 2005. The portfolios constitute a sample, taken from all types of managing corporations: banks, insurance companies and private institutions. Panels B and C of Table 1 (in the Appendix) summarize the nontradable assets in the sample:

If the sample of the funds represents the full span $(n \in N)$ and NTR is not an endogenous variable, then:

(1) The distribution of n over NTR does not significantly differ from the distribution of N over NTR.

(2) There is no correlation between the percentage of NTR and the valuation difference (FV-AV).

Applying distribution tests, we find that (1) cannot be rejected over NTR in 2004 ($P = 0.015$). Neither can (2) be rejected. There is no significant correlation ($P = 0.74$) between NTR and (FV-AV). The possibility that our sample may be biased in terms of the percentage of NTR assets, which are held by each fund, is irrelevant. There is no correlation between the valuation difference and the NTR percentage. We can assume that the higher the percentage of NTR in the portfolio, the higher the difference in valuation. Table 3 summarizes the effect of the Nelson-Siegel valuation; we display the revaluations of April 2005 and August 2005 as made over the 39 nontradable portfolios.

Note the differences in the scale of effect between the revaluation of April 2005 and that of August 2005. The average change in August 2005 is only about one-fifth (20.6 percent) of the April effect. We find four plausible reasons for the low and insignificant August effect: The value of NTR issued before 2003 is only one-third of the total value of 2005 NTR portfolios. A large proportion (26.4 percent value weighted) of the NTR issued before 2003 is in Designated Bonds, which were issued by the government exclusively for the pension funds at low interest, leading to what appears at first to be perplexing, but is quite in line with the facts specific to this case, namely, that their accrued value did not differ much from their fair value. Among the corporate bonds issued prior to 2003, there are significantly fewer (6.7 percent value weighted) SPC bonds in comparison with the 2003–2005 period (19 percent value weighted in August 2005).

In August 2005, when the second stage of fair value had started, RBT added a 25bp flat premium on corporate published yields. The premium negatively affects the Fair Value effect. In terms of information, even though the model's implementation had two stages, the mass media turned a blind eye to the second stage except for a minor acknowledgment after August 1st. Therefore, we expect to see a limited effect, or even no effect at all, on the FoF immediately after August 2005. Indeed, figures A and B demonstrate that no unique event is marked. It is also verified statistically. The main hypothesis of our work is that informed investors make rational financial decisions. Accordingly, if the unique environment of the analyzed event is given, then we consider a set of distinct hypotheses:

Efficiency & Rationality (E&R) – Provident fund investors retrieve private information during the implementation of the fair value model, and they act accordingly—an informed and rational action that can provide them with risk-free return. It is important to note that the E&R hypothesis tests a joint hypothesis:

H1: Market efficiency is semi-strong.

H2: There is a significant cluster of rational agents (immediately prior to the event).

H3: The value of the action (delaying an act) is strictly positive.

H3 is tested independently. As we show, all the sample portfolios have a significant and strictly positive value reaction to FV's implementation. H1 and H2 are tested simultaneously. Acceptance of the hypothesis is to say that, as a whole, all three conditions are satisfied. If H3 is satisfied and the hypothesis is not accepted, then we cannot differentiate between H1 and H2. It may be that either or both are not satisfied. In other words, in order to satisfy both H1 and H2, agents would have to be rational and informed—investors can be rational, yet lack information; or they can obtain the information, yet be bereft of the ability to use it.

Systematically nonzero abnormal security returns that persist after a particular type of event (usually a corporate event) are inconsistent with market efficiency. Event studies which focus on long-term implications of a particular event can provide key evidence regarding market efficiency (Fama, 1991). Our study is different, because the expected returns serve as endogenous variables in the model. The left-side variable is investors' behavior. Our database checks data over 96 monthly data points (January 1999 until December 2006) for 584 provident funds. The data for each fund includes several factors: monthly net deposit (withdrawal); monthly yield; dynamic standard deviation; total assets; management fee; percentage of NTR (2004 and 2005); cluster information regarding the "splitting" of each fund's portfolio into government, investment-grade and non-investment grade assets; managing institution; and size. Some of the data is excised. The rationale for each "filter" is as follows:

(a) Private funds—Funds that are open only to certain depositors (e.g. funds for IDF civilian employees or for a certain agriculture sector).

(b) Funds with total assets (December 2005 prices) of less than $2 million.

(c) The total sum managed by the entire industry is (December 2006 prices) $60 billion.

After the filtering of the data, the database contained 540 provident funds with a total managed portfolio of $52 billion.

A second method of handling the data has to do with the annuity effect. Since the tax benefits are annually compounded, investors and firms often prefer to hold actual deposits until the end of the year. The December effect was stable, because the data was collected[8] (see Figure A). We corrected it by "rounding" each December point—dividing the December deposits minus the expected December deposits by the other eleven months of each year. We built the Expected Deposit (ED) for each fund, after doing the needed correction for the December effect: We computed the expected net deposit, based on the average expected deposit for December 2004 and for the first quarter of 2005.

There are several testable implications of the E&R hypothesis:

I1 Net deposit (withdrawal), during the period in which the information was available, is significantly above the expected trend for specific clusters.

[8] Inflation rates until the late 1980s rendered this information irrelevant.

I2 Net deposit (withdrawal) is significantly below the expected trend, immediately after the implementation of FV for specific clusters.

I3 Net deposit (withdrawal) from funds with high rates of ILA in their portfolios is significantly lower than the expected trend during the period in which the information was available.

I4 Net deposit (withdrawal) from funds with high rates of NTR in their portfolios is significantly higher than expected, immediately after the implementation of FV.

Additional testable and rational implications arise from the work of Del Guercio and Tkac (2008), the most important of which, for our specific interest, is:

I5 Investors in pension funds show significant reaction to risk-adjusted returns rather than to raw returns.

We now test the hypothesis that though investors are not directly cognizant of NTR, they are still biased to the level of NTR by other variables, which are more easily observed. We checked it for variables that appeared in ads and the media.

I6 Clustered bias—H1 is valid, yet investors significantly value other variables (such as the cluster of the holding corporation).

I7 Seemingly irrelevant bias—H1 is valid, yet investors significantly value size, novelty, etc.

The left-side variable was created by using SUR modeling. The dependent variable is the FoF delayed to April 2005 (t_4) from $t_1 - t_3$ observations. The basic framework for our model takes the form of equation D.1:

$$y_{i,j}=x_{i,j}^{`}\beta+z_{i,}^{`}\alpha+\varepsilon_{i,j} \qquad (D.1)$$

where there are K regressors in, $x_{i,j}^{`}$ not including the constant term. The heterogeneity, or the individual effect, that we define for each fund, is $z_{i,}^{`}\alpha$, and contains a constant term and a set of individual variables.

In our model, $z_{i,}^{`}$ is constant. The variable is pooled from the aggregate FoF. OLS provides consistent and efficient estimates of the common α. The cross-section observations are auto-correlated, as they all derive their value from time-dependent series.

In order to apply ourselves to auto-correlation, we use the SUR model. The SUR model can accommodate heteroskedasticity, as well as auto-correlation. We use the generalized SUR model of Bartels and Fiebig (1991):

$$\Omega = A[\sum \otimes I]A^{i} \qquad (D.2)$$

where A is a block diagonal matrix.

For each fund we run an SUR-type single-variable OLS regression. For each fund we forecast the expected rate of net injections (ne) for each of the four observations t_1, t_2, t_3, t_4. Each observation was compared to its actual value. For some funds, the rate was positive, while for others it was in the negative. Each observation was normalized by the total assets that were held by the fund in December 2005. The left-side variable is AFF (Adjusted FoF).

$$AFF_i = \frac{\left| ne_i(t_4) - \exp(ne_i(t_4)) - \sum_{j=1}^{3} ne_i(t_j) - \exp(ne_i(t_j)) \right|}{SIZE_i} \tag{D.3}$$

Some of the right-side variables are directly observable: the "age" of the fund, its ownership structure and its past performance. Our key variables were related to the portfolio structure of each fund. The actual portfolio for t_4 is not available. The performance reports of the funds are provided annually. We calculated variables by assigning a close approximation; the end-of-year ratio of nontradable assets in i fund (portfolio) is presented as a percentage of the total portfolio. Nontradable assets are purchased throughout the year. We use the available NTR2004 for December 2004 as the proxy; then we use our sample of the portfolios to test the proxy.

We examine the sample of 39 portfolios of various provident funds. We compare the actual portfolios at various dates from November 2004 and March 2005 until the end of 2005. The portfolios of all 584 funds were published in June 2006. No NTR assets were sold by any of the 39 funds. The only changes in the portfolios resulted from the maturing process of the bonds and the purchase of new issues. Comparison of the NTR rate at the end of 2004 to the NTR rate at the end of 2005 showed that the average fund's NTR holdings grew from 18.18 percent to 21.20 percent. The change was driven by the fact that private funds received higher net new investment from the public (see Table 1 panel A in the Appendix).

Historic return is a common variable, applied for financial decision measurement. We calculated two types of return. According to Edelen's (1999) results, a decision to re-allocate personal endowment is based on historic raw return, while according to Del Guercio and Tkac's (2002) proposal, the decision is based on risk-adjusted return. The concrete, tangible, substantial decision in our model is not to reallocate, but rather to delay the reallocation. Regarding the short- and long-term raw return, RQ12005 represents the average returns in the first quarter of 2005; RQ42004 represents the average returns in the fourth quarter of 2004; R2004 represents the average returns in 2004; R20034 represents the average returns in the years 2003–2004 (together). We have processed the risk-adjusted return by computing the moving average standard deviation of each fund, spanning 36 months. Risk-adjusted return variables are represented as RARQ42004 and RAR2004. Considering the public debate of those days, the above-average marketing and the

advertising activities of the private sector, we believe the holding structure has a plausible rationale. The other variables are:

DBANK – Dummy variable. Granted to funds held by banks.

DPRV – Dummy variable. Granted to funds held by private investment houses.

DINS – Dummy variable. Granted to funds held by insurance firms.

FUNDAGE: (Fund Age) – Discrete variable. Funds that were established before January 1999 receive the value 0. Funds that were established after January 1999 receive positive values of 1 to 80. We believe this variable is important, because it was the common practice of the banks to establish new funds when they also had simultaneous holdings in existing funds.

MNGF (Management Fee) – Measured annually, in percentages of managed assets.

SIZE – Size of fund, in millions of shekels.

TRL (Theoretic Risk Level) – Measuring the risk level of each fund's portfolio, based on its actual holdings, as observed in December 2004 and December 2005. We used the scorecard method to rate the assigned risk to each portfolio. Each portfolio was assigned a rate based on a non-linear score of its risky holdings: government bonds received a score of zero, high-graded corporate bonds received a score of one, and so forth.

E. RESULTS

The empirical methods we use are straightforward. We use SUR modeling to simultaneously forecast the expected values of the four relevant observations (from January until April 2005). The results generated the AFD vector. The analysis is done by OLS & TSLS methods. We find there is no significant correlation with the potential of altering the OLS basic assumption of independence. It is reasonable to expect that there would be independent behavior (Sirri and Tufano, 1998) of various funds that are owned by one financial institution.

Table 4 (see Appendix) presents a summary of statistical data for the full sample of funds. Our chosen right-side variable (NTR2004) distribution is close to normal. Most of the control variables are skewed to the left, and we are therefore of the opinion that this is reasonable. The mean (monthly) fund yield for 2004 was 0.74 percent, while the minimum and maximum yields were -0.27 percent and 3.22 percent. These figures fit Sirri and Tufano's (1998) and Edelen's (1999) results: The worst funds are not doing as bad as the best funds are excelling.

Table 5 (see Appendix) shows the correlation between key variables. Noteworthy correlations are bolded. The poor correlation between SIZE and NTR2004/2005 is somewhat surprising, since the larger funds are those held by the banks, and since it took place at a time at which the banks had above-average holdings of nontradable assets. Return

was correlated with management fees (0.33) and with synthetic risk (0.59). The private funds charged higher management fees (Mean: 1.39, Median: 1.41) than did the banking group (Mean: 0.70, Median 0.73). We test I1 and I2 implications by a variance test. Table 4 summarizes the results of the variance test for each cluster. For the test, we use a smoothed trend line.

Given the slope of the endowment, the distinctiveness of the April 2005 (negative) endowment is clearly significant. The results support I2 directly: I2 cannot be rejected. I1 is less significant concerning all categories, except the small caps of the private sector funds. The poor significance of I1 may result from several factors: (a) In the banking sector, some of the FoF was internal (e.g. a flow from one fund to another, both owned by the same bank, yet with different investment strategies and perhaps different historic returns); (b) The negative flow of April 2005 includes not only funds that at a later date moved to other managers, but also a higher-than-average net negative flow of fund withdrawals.

We control for hypothesis I2 over previous Aprils. We reject hypothesis I2 for all four Aprils from 2001–2004 (See Table 6). Net deposits are not significantly different from the expected trend.

Table 7 Panel A illustrates our main result presented by the following equation:

$$AFF = \alpha + \beta_1 NTR2004 + \beta_2 R2004 + \beta_3 MNGF + \beta_4 SIZE + \beta_5 TRL + \beta_6 D_i + \varepsilon \quad \text{(E.1)}$$

Additional equations, estimated with various sets of regressors and variable manipulations, are shown in panels B and C of Table 7. In all equations, the left-side variable is AFF, and we are interested in NTR2004. R^2 in all equations is in the range between 0.15 and 0.18. NTR2004 is robust to a series of manipulations. Our main hypothesis I3+I4 are jointly estimated; I3+I4 cannot be rejected. The rate of nontradable assets in a given portfolio i is a significant factor for the allocation decisions of the investors. In all regressions, the raw return (R2004 and R20034) is significant, while risk-adjusted return (RAR2004) is not. These results are robust over various time frames, which are reflected in the variables (one quarter to eight quarters' timeframe). I5 was rejected in all equations.

Robustness Tests

Many of the new funds underwent a significant portfolio change during 2005. With a growing positive net FoF and 75 percent of the new bond acquisitions coming from nontradable offerings many of the funds, which had low rates of NTR in their portfolios in December 2004, had higher-than-average NTR rates one year later. The bank-owned funds are exceptions. By way of a response to the private funds, many of the banks launched new funds that had higher rates of risky assets. These new funds obtain higher returns. We use the set of bank-owned funds merely for the sake of testing robustness over time. Table 7 panel B shows the results for the sample of bank-owned funds only. Table 7 Panel C is a variation of equation E.1:

$$AFF = \alpha + \beta_1 NTR2005 + \beta_2 R2004 + \beta_3 MNGF + \beta_4 SIZE + \beta_5 TRL + \beta_6 D_i + \varepsilon \quad (E.2)$$

When we use NTR2005, the results are significantly weaker: NTR2005 is the percentage of the nontradable assets on December 31st, 2005. During 2005, many of the new funds increased their NTR assets. Therefore, NTR should be deprived of its' explanatory power.

Next, we verify that our set of regressors is uncorrelated with the disturbance term. If this assumption is violated, then OLS/WLS are biased and inconsistent. There are a number of situations where some of the right-side variables are correlated with disturbances. One of these is endogenously determined variables on the right side of the equation. For the sake of simplicity, we refer to variables that are correlated with the residuals as endogenous and to variables that are not correlated with the residuals as exogenous or predetermined. We apply the standard approach when right-side variables might be correlated with the residuals. It is executed by estimating the equation using instrumental variables. Table 8 panels A and B (see Appendix) are two-stage regressions. We use the exogenous variables, such as the ownership dummies, the fund age, the management fee and the exogenously defined risk. NTR2004 was significant in 5 percent of the cases. Some of the control variables were correlated at various levels with the residuals. The main results remained robust.

F. THE SIZE OF THE "RATIONAL INVESTORS" CLUSTER

Identifying the "rationality" of a population is difficult. Behavioral Finance literature tracks behavioral aspects that are in flagrant contradiction with the financial theory. By reviewing works whose explicit or implicit purpose is to document the decision-making processes that are rather below the par of "rationality" (such as asset allocation and risky assets preferences) we aim to quantify the magnitude of decision making that "significantly diverges from rationality".

Using Allais payoffs, Prelec (1990) documents a dramatic Fanning effect of 55 percent of the subjects. Chew and Waller (1986) did a within-subjects analysis of choice preferences. 82 percent of their subjects took inconsistent risk decisions. In their documentation9 of Anchoring, Alpert and Raiffa (1982) show that correct adjustments were made in only 30–50 percent of cases. Kroll, Levy and Rapoport's (1988a, 1988b) experimental study presents portfolio problems. Regarding the theoretical prediction, more than 62 percent of their subjects had invested too deeply and heavily in high-return assets. More than 25 percent of the portfolio choices were stochastically dominated by those portfolios in which more funds are invested in low-yield assets. Subjects were paid

[9] The typical behavioral experiment is executed over a time period of less than an hour. See for instance the survey by Thaler and Barberis (2002)

according to their actual performance ex-post. Later, some of the subjects were paid ten times as much in order to see how their behavior would change. Highly paid subjects invested 35 percent more in the low-return-low-risk assets. The subgroup of highly paid subjects' portfolios was significantly closer to the optimal mixture. These studies are mentioned due to the fact that, in all these above-mentioned experiments, subjects had substantial time (up to weeks) for making decisions.

In each of these experiments, and by their very nature, there is a complementary group of subjects who make the "right" rational decisions. We set the lower bound, which is documented in the experimental literature, as the upper bound. Should a 50 percent violation rate of the rationality axiom be considered large or small? Supposing that 50 percent of the people in the sample are not making rational decisions, is it legitimate to see it as ample data to conclude that the population is irrational? If we allow a random error in expression of preferences, then a possible benchmark for violation rates should be the fraction of people who switch their choices when making the same choice twice (referred to as "reliability" in psychometrics10). Several studies suggest that the appropriate percentage is about 25–35 percent for choice sets that resemble these choice sets (Starmer and Sugden, 1987; Camerer, 1989). This benchmark is in line with the works of Alpert and Raiffa (1982) and Kroll, Levy and Rapoport's (1988a, 1988b).

Reliability cannot be tested in a case study. Therefore, in our experiments, we use the bounds set in order to document deviations from rational expectations. There is an upper bound for expected rational decision-making. It is subject to random errors. This upper bound is approximately 70 percent of the decision makers. In other words, we can expect that trading "noise" would prevent about 30 percent of the investors from making rational decisions, even in the best (field) conditions. The lower bound is set at 40-45 percent, meaning that if the complementary cluster of decision-makers is larger than 60 percent, then, although the event may have a significant effect regarding rationality, one cannot determine that the population is rational. Instead, it only means that a significant cluster of rational investors exists. This caveat is very important, as even under plausible terms of time, availability of information and financial effect, the overall population of private investors does not make rational decisions.

What is the magnitude of the rational decision-making cluster? We can control the level of information by analyzing the performance of the largest 50 funds, which are managed by the eight banks. The funds are separated into three clusters:

Highly Informative - Funds managed by banks that directly provide information to their investors.

Medium Informative - Funds managed by banks that inform only the bankers and consultants (indirect information).

Low Informative - Funds managed by banks that do not provide any information.

For each fund we calculate the expected infusion in April 2005, using the forecasts of the SUR regression. We plot two scenarios:

[10] Slovic, Lichtenstein and Edwards (1965).

1. January Scenario – Investors are informed by January 1st. Presupposing rationality, the expected significant withdrawal benchmark is 25 percent.
2. February Scenario – Investors are informed only by February 1st. Expected significant withdrawal benchmark is 33 percent.

In Table 9, panels A and B show the results of the January and February scenarios respectively. The aggregate result for the bank funds is 26.9 percent of withdrawals—insignificantly different from the benchmark of 25 percent. As for Cluster 1, we find that the April 2005 withdrawals were aggregated to 45 percent, significantly (at 95 percent) higher than the benchmark for Cluster 1 funds. As for Clusters 2 and 3, the results differ, but insignificantly, from the benchmark.

If we assume the second scenario happened, then the information became available only on February 1st. In that case the ratio is 29.1 percent. Only if we assume that the information became available to investors on March 1st, does the ratio project rationality (i.e. 51 percent of the flow is unexpected additional April flow). There is no evidence that supports the blockage of information until March 1st.

One must admit that these figures are unfamiliar to the discourse of behavioral finance. In a market with sufficient liquidity, rationality does not require that a majority of investors be rational and informative. If an arbitrage appears, the market can clear it immediately, while the surplus wealth can be won by as little as one agent. Agents can either win their own share or lose it forever. The structure of the provident fund market denies the ability of the agents to purchase rights to buy or borrow other agents' funds. In other words, the arbitrage cannot be cleared.

G. DISCUSSION

Given the need to make an actual financial decision under actual conditions (though they are very favorable in terms of time frame, ability to consolidate, verification of information, and so forth), there is a cluster of investors who make financial decisions as if they are the ideal informed and rational decision-makers. Yet they do not form the majority of investors: Provident fund investors, as a rule, are not rational decision-makers.

Our results are unique, since they are derived from an exceptional data set that could not have been created without the decision of the regulator to create the "experiment". It is also remarkably distinctive in its challenging experimental results. The literature of experimental economics has thoroughly documented the two parameters the value of which we sought to determine: (a) How well are agents informed? (b) How rational are their actions?

This study leads directly to the following set of questions: (a) If agents' behavior differs from expectations and predictions from the rational assumption, even under the best conditions, what is the real value of the predictions of financial theory in other "noisier"

events? (b) Given the same results and conditions, how can we validate which behavioral theory, if any, supports irrational behavior in experiments?

Based on ideas from recent psychology literature about the cognitive process of decision-making (Reyna, 2004), we suggest that if the alternative at least seems non-negative, then the fact that no visible damage may occur (such as negative yield) causes the investors to direct their attention to the salient elements in the formal description of the decision—the seemingly significant ones. At the same time agents neglect other features of the situation, despite their normative relevance.

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Figure 1
The FoF over the sample period—after correcting the "December effect"

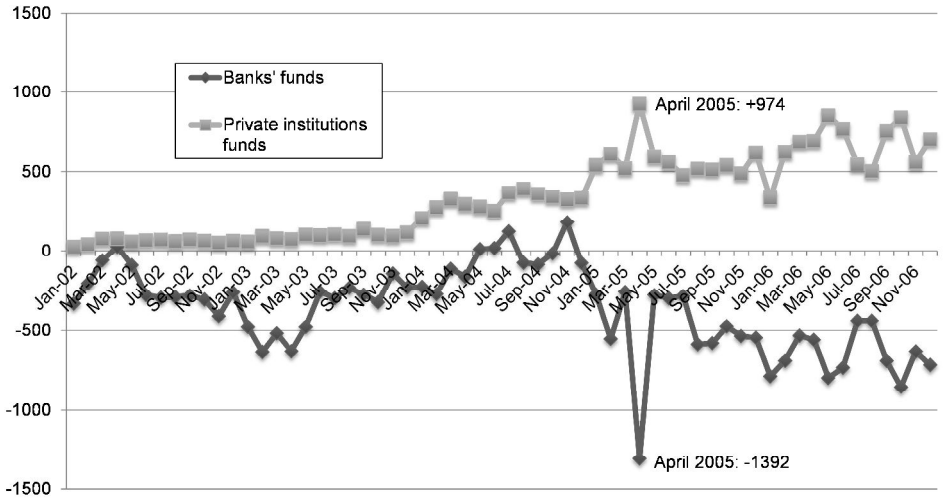

Figure 1 shows the FoF in the period between January 2002 and December 2006 for the two major categories. Here we correct the December effect (derived from end-of-year deposits). The lower line shows the FoF of all the bank-owned provident funds, while the upper (thicker) line shows the FoF of all the privately-owned funds. The banks' line is generally negative. The highest positive period is just before the April 2005 event.

Figure 2
Assets Under Management

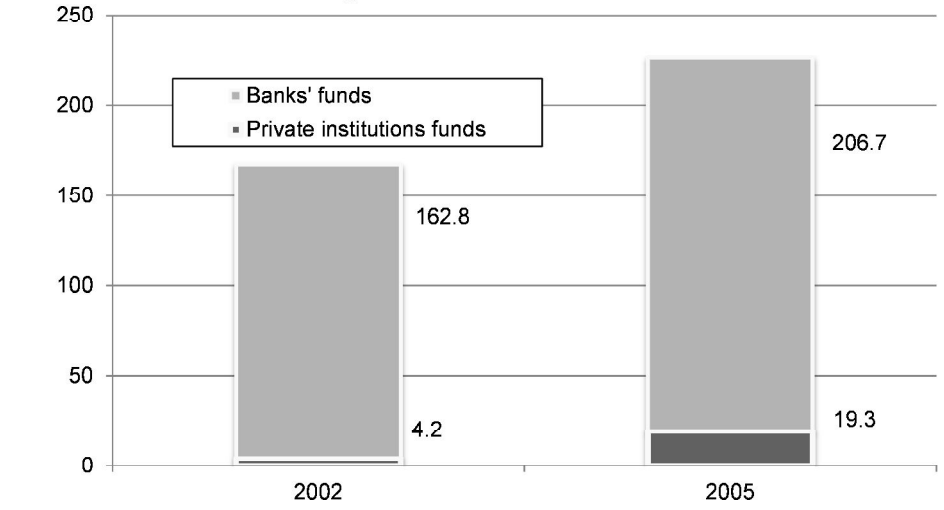

Figure 2 shows the distribution of asset management among private institutions and banks. In three years, the market value grew by 35 percent. Assets managed by the private sector grew by 360 percent over the same period.

Figure 3
One-year expected real return on government bonds

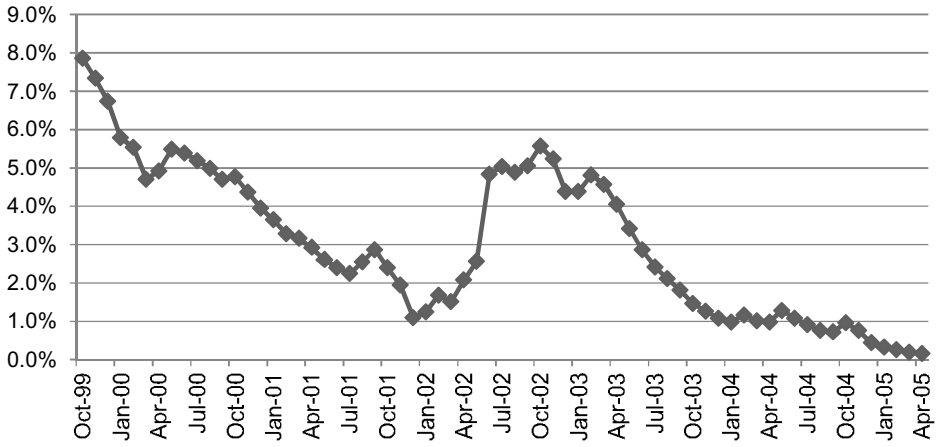

Figure 3 shows the patterns of the "Real Rate" over the period from 1999 to 2005. More than 90 percent of corporate bonds and 65 percent of government bonds are CPI-indexed. The decrease in the real rate from 3 percent in the late 1990s to 0 percent in 2004 exposed the "Cookie Jar" embedded in the AV method.

Figure 4:
RBT's weekly yield to maturity graph

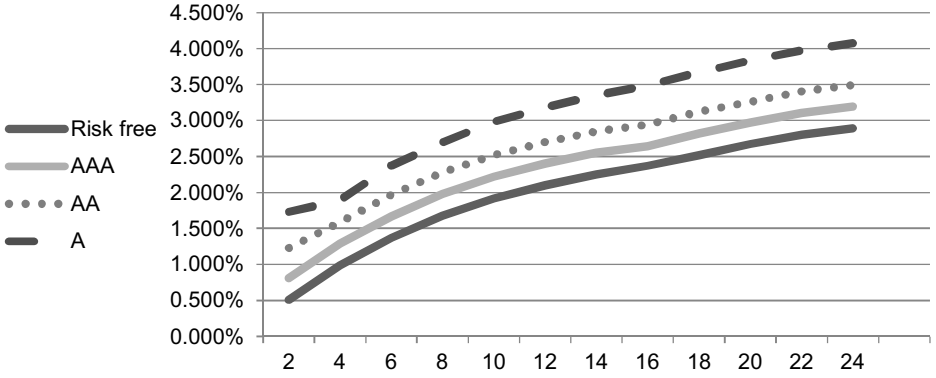

Figure 4 provides a "screenshot" taken from the RBT system. The yield curves are also provided as XML tables that enable exact computation. The data is computed on a weekly basis. The lower line shows the yield curve for risk-free bonds, the second line from the bottom is the AAA yield, and so forth.

Table 1 Panel A

Values(%)	NTR2004	NTR2005
Mean	18.18	21.2
Median	20.5	23
Maximum	47	61
Minimum	0	0
Std. dev.	11.73	11.01
Skewness	0.13-	0.11-
Kurtosis	2.03	3.51

NTR is the parameter we focus on as the left-side variable. Table 1 shows the difference between the levels of nontradable assets in the years 2004 and 2005 (end-of-year figures). The average increases by 16 percent and the mean increases by 12 percent. The maximum percentage of NTR out of the overall managed assets of a specific fund grew to 61 percent. The kurtosis grew significantly, suggesting that although the average fund increased its NTR, a significant number of funds decided to decrease NTR—thus creating distinctive different portfolios

Table 2 Panel A

Nontradable assets as a percentage of portfolio[a]	Average	MAX	Min	Variance
Sample (n=39)	22.3	39.3	8.2	14.2
Population (N=584)	18.2	47.5	0	11.4

[a] Equally weighted.

Table 2 Panel B

Issue time of NTR assets as a percentage of NTR portfolio[a]	Average	MAX	Min	Variance
Before 2003	31.5	43	0	21
After 2003	68.5	57	100	13.4

[a] Equally weighted

In Table 2, we divided each portfolio in the sample into two categories: NTR assets issued prior to and afterJanuary 1, 2003.

For each portfolio we calculate the value of nontradable assets twice:

AV method – Duplicating the method of the funds (Treasury's instructions valid until March 31, 2005.)

FV method – Applying the RBT version of the Nelson-Siegel model, including the same adjustments made by RBT (Treasury's instructions valid after April 1st, 2005) .

In Table 2 Panels A and B, we analyze 39 actual portfolios that were held by the provident funds on December 31st, 2004. The Nelson-Siegel adjusted valuation model was run on each portfolio for a specific valuation. Each portfolio is the one reported by each fund in a specific week between November 2004 and March 2005. The portfolios are a sample taken from all types of managing corporations: banks, insurance companies and private institutions.

Table 3: Fair Value effect

n = 39	Average change	Minimum change	Maximum change
Change in value (per NTR portfolio) % FV —April 2005	6.55	4.25	8.12
Change in value (per NTR portfolio) % FV —August 2005	1.35	0	1.93

Table 3 summarizes the effect of the Nelson-Siegel valuation. The April 2005 and August 2005 revaluations are given over the 39 nontradable portfolios. Applying distribution tests, we find that (1) cannot be rejected $(P = 0.015)$ over NTR in 2004. Neither can (2) be rejected. There is no significant correlation $(P = 0.74)$ between NTR and (FV-AV). The possibility that our sample may be biased in terms of the percentage of NTR assets that are held by each fund is irrelevant. There is no correlation between the valuation difference and the NTR percentage. We can assume that the higher the percentage of NTR in the portfolio, the higher the difference in valuation.

Table 4: Descriptive Statistics

	NTR2004 (percent)	TRL	SIZE (NIS)	FUNDAGE (months)	MNGF (percent)	R2004 (monthly, percent)	R20034 (monthly, percent)	RAR2004 (monthly, percent)
Mean	18.21	5.13	670,190	12.22	0.85	0.74	1	0.83
Median	20.75	3.28	144,670	-	0.8	0.71	0.96	0.73
Maximum	47	81.07	20,621,560	62	2.2	2.36	3.22	6.61
Minimum	0	0.1	540	0	0.25	-0.27	-0.27	-0.28
Std. dev.	11.48	9.69	1,862,120	20.42	0.5	0.27	0.4	0.71
Skewness	-0.15	4.94	6,720	1.31	0.29	1.34	1.12	6.32
Kurtosis	2.06	30.57	59,190	3.09	2.32	9.46	8.25	47.94

Table 4 describes the statistics for the main regressors we use. Some of the regressors are replaced in some of the various regressions. The differences between any pairs of variables which are used (for example, the two years of past return (R20034) and the three years of past return (R20024)) are sufficiently small.

Table 5: Correlation Table

	NTR2004	FUNDAGE	MNGF	R20034	RAR2004	SIZE	TRL
NTR2005	0.849	-0.506	-0.344	-0.16	-0.123	0.179	-0.252
NTR2004		-0.292	-0.094	-0.161	-0.117	0.144	-0.303
FUNDAGE			0.293	-0.023	0.076	-0.185	0.131
MNGF				0.329	-0.079	-0.146	0.212
R20034					-0.104	0.021	0.592
RAR2004						-0.037	-0.101
SIZE							-0.022

Table 5 shows the correlation between the regressors that are described in Table 3. The correlation between the fund age (FUNDAGE) and the nontradable assets rate (NTR) is strictly negative. In addition, the positive correlation between past performance (R20034) and the *Theoretic risk level* (TRL is significant).

Table 6

z-test	**I1**	**I2**		
Banks (all)	1.85*	24.07***		
Private (all)	2.40**	19.71***		
Banks (large)	2.55**	23.10***		
Banks (other)	1.6	17.53***		
Private (large)	2.32**	15.34***		
Private (other)	3.12**	26.45***		
Insurance	2.01*	7.55***		
z-test for I2	**Apr-01**	**Apr-02**	**Apr-04**	**Apr-04**
Banks (all)	0.86	0.72	0.56	1.02
Private (all)	1.09	0.88	-0.32	0.45

*** rejected at 0.99 ** rejected at 0.95 * rejected at 0.90

Table 6 elucidates the "eyeball statistics" which were shown in Figures A and B. Given the slope of the endowment, the distinctiveness of the April 2005 (negative) endowment is clearly significant. The results support I2 directly: I2 cannot be rejected. I1 is less significant over all categories, except the small caps of the (true?) private sector.

Table 7 Panel A
Dependent Variable: AFF

Variable	Coefficient	Std. Error	Prob.
C	134.358	72.009	0.063
NTR2004	-16.109	2.604	0.002***
R2004	147.663	73.104	0.044**
DBANK	-29.963	44.991	0.506
DINS	152.527	64.355	0.018**
DPRV	154.351	64.507	0.017**
MNGF	-53.276	43.848	0.225
SIZE	-0.002	0.009	0.823
TRL	-1.731	2.053	0.4
R-squared	0.171	Mean dependent var.	113.72
Adjusted R-squared	0.143	S.D. dependent var.	285.73

*** rejected at 0.99 ** rejected at 0.95 * rejected at 0.90

Table 7 Panel A shows the results of regression over Equation E.1

$$AFF = \alpha + \beta_1 NTR2004 + \beta_2 R2004 + \beta_3 MNGF + \beta_4 SIZE + \beta_5 TRL + \beta_6 D_i + \varepsilon$$

We show that some of the control variables are insignificant. We find that size (SIZE*)* and management fees (*MNGF*) are insignificant under various checks of robustness. Raw return i**s** a significant factor under various scenarios. The Dummy variables DINS and DPRV, which control for ownership structure, are also significant, suggesting that investors who reallocate their investments base their decision on the fund's owner, regardless of its performance. This type of information is biased, since not all private funds exceed the synthetic benchmark**.**

Table 7 Panel B
Dependent Variable: AFF

Method: Least Squares			
Sample (adjusted): 2 -773 IF DBANK = 1			
Variable	Coefficient	Std. Error	Prob.
C	32.507	33.316	0.331
NTR2004	-15.44	0.669	0.013**
FUNDAGE	1.058	0.487	0.032**
R20034	10.179	30.634	0.74
RAR2004	18.758	6.062	0.002***
SIZE	-0.002	0.001	0.019**
TRL	2.566	2.319	0.271
R-squared	0.262	Mean dependent var	56.13
Adjusted R-squared	0.227	S.D. dependent var	108.06
*** rejected at 0.99 ** rejected at 0.95 * rejected at 0.90			

Table 7 panel B shows the results for the FoF of the sector of funds owned by the banks. The regression is: $AFF = \alpha + \beta_1 NTR2004 + \beta_2 R2004 + \beta_3 MNGF + \beta_4 SIZE + \beta_5 TRL + \varepsilon$. We show that some of the control variables are significant within the subsample. Size (SIZE*)* and the fund's vintage (FUNDAGE) are significant. Risk adjusted return is significant only for this subsample. A plausible explanation is that many of the banks established new funds with higher rates of risky assets, as a response to the private funds which showed higher returns. We use the set of bank-owned funds only to test robustness over time.

Table 7 Panel C
Dependent Variable: AFF

Variable	Coefficient	Std. Error	Prob.
C	1534.126	71.109	0.054
NTR2005	-2.23	4.604	0.102
R2004	151.611	69.204	0.034**
DBANK	-27.91	4222	0.501
DINS	150.512	62.335	0.019**
DPRV	157.311	61.504	0.019**
MNGF	-123.276	33.44548	0.215
SIZE	-0.002	0.007	0.523
TRL	-3.731	1.753	0.102
R-squared	0.159	Mean dependent var.	116.7
Adjusted R-squared	0.133	S.D. dependent var.	295.72

*** rejected at 0.99 ** rejected at 0.95 * rejected at 0.90

Table 7 Panel C shows the results of regression over the equation:

$$AFF = \alpha + \beta_1 NTR2005 + \beta_2 R2004 + \beta_3 MNGF + \beta_4 SIZE + \beta_5 TRL + \beta_6 D_i + \varepsilon$$

where NTR2005 is the nontradable (assets) rate in Dec. 2005. We show that that some of the control variables are insignificant. NTR2005 is insignificant, given the changes in the allocation of assets during the period Dec. 2004–Dec. 2005. Other factors retained their relative significance. Size (SIZE*)* and management fees (*MNGF*) are insignificant under various robustness checks. Raw return is significant under various scenarios. The dummy variables DINS and DPRV, which control for ownership structure, are also significant, suggesting that investors who reallocate their investments base their decision on the fund's owner, regardless of its performance. This type of information is biased, since not all private funds exceed the synthetic benchmark.

Table 8 Panel A
Dependent Variable: AFF method: two-Stage Least Squares

Included observations: 523			
Variable	Coefficient	Std. Error	Prob.
C	62.921	76.17518	0.4095
NTR2004	-13.267	3.679206	0.0398**
FUNDAGE	2.796	0.912373	0.0024***
R2004	84.974	57.36278	0.1396
RAR2004	5.440531	21.62304	0.8015
DINS	104.9078	59.69593	0.0799*
DPRV	82.75068	52.9722	0.1194
R-squared	0.186	Mean dependent var	113.71
Adjusted R-squared	0.166	S.D. dependent var	285.72
*** rejected at 0.99 ** rejected at 0.95 * rejected at 0.90			

Table 8 Panel A show a TSLS run over Equation E.2. We use the exogenous variables such as the ownership dummies, fund age, management fee and exogenously defined risk. NTR2004 was significant in 5 percent of the cases. Some of the control variables were correlated at various levels with the residuals. The main results remained robust.

Table 8 Panel B

Included observations: 523			
Variable	Coefficient	Std. Error	Prob.
C	71.121	76.171	0.34095
NTR2005	-6.417	2.6796	0.07198*
FUNDAGE	2.791	0.92123	0.0023***
R20034	76.654	37.36278	0.089*
RAR2004	4.4544	21.62304	0.76515
SIZE	-0.002	0.001	0.019**
TRL	2.566	2.319	0.271
R-squared	0.236	Mean dependent var	110.7
Adjusted R-squared	0.216	S.D. dependent var	245.22
*** rejected at 0.99 ** rejected at 0.95 * rejected at 0.90			

Table 8 Panel B show a TSLS run over Equation E.2.2, for the sector of funds owned by the banks. We use the exogenous variables – such as the ownership dummies, fund age, management fee and exogenously defined risk. NTR2004 was significant at 5 percent of the cases. Some of the control variables were correlated at various levels with the residuals. The main results remained robust. Size (SIZE*)* and the fund's vintage (FUNDAGE) are significant. Risk adjusted return is significant only for this subsample. A plausible explanation is that many of the banks established new funds with higher rates of risky assets as a response to the private funds which showed higher returns. We use the set of bank-owned funds only to test the robustness over time.

Table 9 Panel A

Cluster	BANK by cluster	Net deposits January-April ($ million)	Net deposits January-March +E(April) ($ million)	Rate	Weighted
	1	-122.9	-115.7	94%	13.40%
	2	-161.4	-92.4	57%	6.00%
	2	-83.5	-75.9	91%	6.10%
	1	-62.4	-46.3	74%	4.10%
	2	-69.5	34.5	-50%	2.20%
	1	-254.4	-46.3	18%	0.40%
	2	-105	-36.8	35%	1.30%
	1	-23.3	-34.6	148%	3.70%
	2	-60	-36.7	61%	0.70%
	1	-20.4	-27.3	134%	1.20%
	2	-24	-24.4	102%	1.60%
Cluster A	2	-44.4	-17.1	39%	0.10%
	2	-26	-16.8	65%	0.30%
	2	-2.2	-11.1	505%	1.10%
	1	-4.3	-5.9	137%	0.50%
	1	-1.5	-4.9	327%	0.80%
	1	-1	-2.5	250%	0.50%
	1	-2.2	-2.2	100%	0.40%
	1	64	-1.8	-3%	0.30%
	1	-15.9	-1.7	11%	0.20%
	1	-8.7	-1.3	15%	0.20%
	Sum	**-1029**	**-567.2**	**55.12%**	**45.10%**
	3	-182.3	-43.2	24%	2.70%
	4	-58.4	-16.8	29%	1.40%
	3	-26.9	-9.5	35%	1.30%
	3	-15.3	-9.2	60%	4.20%
	5	-22.5	-8.9	40%	8.40%
	5	-17.7	-6.5	37%	1.50%
	5	-15.4	-4.9	32%	2.90%
	3	-5.8	-2.2	38%	2.50%

	3	-28.8	-2.1	7%	0.40%
	4	-1.7	-1.3	76%	1.20%
Cluster B	4	-7.7	-1.5	19%	0.40%
	5	-6.2	-1.3	21%	0.60%
	4	-27.5	-1.2	4%	0.10%
	5	-4.9	-1	20%	0.20%
	3	-5.3	-1.1	21%	0.20%
	4	-3.5	-1.5	43%	0.60%
	5	-3.6	-1.3	36%	0.10%
	3	-3.5	-0.9	26%	0.10%
	Sum	**-437**	**-114.4**	**26.18%**	**28.80%**
	6	-47.2	-13.4	28%	6.70%
	6	-36.8	-12.1	33%	3.30%
	7	-28.8	-5.5	19%	0.90%
	7	-24.9	-5.3	21%	1.60%
Cluster C	8	-19.7	-5	25%	1.70%
	8	-18.9	-4.4	23%	1.50%
	6	-9.1	-2.8	31%	1.50%
	8	-6.7	2.6	-39%	1.20%
	6	-3.3	-1.3	39%	1.00%
	Sum	**-195.4**	**-47.2**	**24.20%**	**19.40%**

Table 9 Panel A illustrates the January scenario. The aggregate result for the bank funds is 26.9% percent of withdrawals, and it is insignificantly different from the benchmark "Rationality ratio" of 25% percent. As for Cluster 1, we find that the April 2005 withdrawals were aggregated to 45% percent, i.e. significantly (at 95% percent) higher than the benchmark for Cluster 1 funds. For Clusters 2 and 3, the results differ insignificantly from the benchmark.

Table 9 Panel B

Cluster	BANK by cluster	Net deposits February-April ($ million)	Net deposits February-March +E(April) ($ million)	Rate	Weighted
	1	-119.1	-111.7	94%	13.20%
	2	-76.5	-92.4	121%	7.70%
	2	-62.1	-75.9	122%	6.80%
	1	-62.4	-46.3	74%	4.40%
	2	-59.5	34.5	-58%	2.80%
	1	-103	-46.3	45%	0.80%
	2	-87.4	-36.8	42%	1.90%
	1	-23.3	-34.6	148%	4.20%
	2	-54.1	-36.7	68%	1.70%
	1	-13.4	-26.1	195%	1.20%
	2	-26	-24.4	94%	1.60%
Cluster A	2	-24.4	-17.1	70%	0.10%
	2	-8.6	-11.8	137%	0.70%
	2	-2.2	-11.1	505%	1.60%
	1	-4.3	-5.9	137%	0.70%
	1	-7.5	-4.9	65%	1.40%
	1	-2.3	-2.2	96%	0.90%
	1	-2.2	-2.2	100%	0.60%
	1	43	-1.8	-4%	0.60%
	1	-8.9	-1.9	21%	0.40%
	1	-8.7	-1.5	17%	0.20%
	Sum	**-712.9**	**-557.1**	**78.15%**	**53.50%**
	3	-104.3	-41.2	40%	1.80%
	4	-45.1	-16.8	37%	1.10%
	3	-23.1	-9.5	41%	0.40%
	3	-15.3	-9.2	60%	1.50%
	5	-12.5	-8.9	71%	1.00%
	5	-8.7	-6.5	75%	1.20%
	5	-15.4	-4.9	32%	1.40%
	3	-5.8	-2	34%	1.00%

	3	-28.8	-2.1	7%	0.40%
	4	-1.7	-1.3	76%	0.20%
Cluster B	4	-7.7	-1.5	19%	0.40%
	5	-6.2	-1.3	21%	0.10%
	4	-18.5	-1.2	6%	0.10%
	5	-4.9	-1	20%	0.20%
	3	-4.3	-1.1	26%	0.20%
	4	-2.5	-1.5	60%	0.10%
	5	-3.6	-1.3	36%	0.00%
	3	-3.5	-0.7	20%	0.00%
	Sum	**-311.9**	**-112**	**35.91%**	**11.20%**
	6	-19.2	-12	63%	11.60%
	6	-16.8	-12.1	72%	3.40%
	7	-11.5	-5.5	48%	0.33%
	7	-8.7	-5.3	61%	1.60%
Cluster C	8	-11.7	-5	43%	0.54%
	8	-12	-4.4	37%	1.80%
	6	-9.1	-2.8	31%	1.50%
	8	-6.7	2.6	-39%	1.10%
	6	-3.3	-1.3	39%	0.12%
	Sum	**-99**	**-45.8**	**46.30%**	**21.99%**

Table 9 Panel B illustrates the February scenario – the information became available only on February 1st. "The rationality ratio" is 29.1% percent. For Cluster 1, we find that the April 2005 withdrawals were aggregated to 53% percent, i.e. significantly (at 95% percent) higher than the benchmark for Cluster 1 funds. For Clusters 2 and 3, the results are below the benchmark, but the small sample does not allow for a comprehensive analysis followed by unequivocal conclusions. Only if we assume that the information became available to investors on March 1st does the ratio project rationality (i.e. 51% percent of the flow is unexpected additional April flow). There is no evidence to support the latter assumption.