



**Chasing Their Tails: Inflow Momentum and Yield  
Chasing among Provident Fund Investors in Israel**

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# **Chasing Their Tails: Inflow Momentum and Yield Chasing among Provident Fund Investors in Israel**

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## **Abstract**

This paper examines the short-run relationship between provident fund yields and investment in provident funds. Using Panel VAR regressions, we find that there is short-term momentum in provident fund yields and flows and investors engage in short-term yield chasing. We also find positive effect of flows on short term yields. We reinforce these conclusions by dividing our sample to pre-crisis, crisis and post-crisis estimation and confirming our main results in the sub-periods. Additional evidence seems to suggest that investor yield chasing is affected by fund risk and management fees.

**רודפים אחר זנבם: רדיפת תשואות ומומנטום בצבירות בקרב המשקיעים**

**בקופות הגמל בישראל**

**נדב שטינברג ויהודה פורת**

## **תקציר**

עבודה זו בוחנת את הקשרים קצרי-הטווח בין התשואות בקופות-הגמל בישראל להשקעות בקופות-הגמל. אנחנו משתמשים במתודולוגיה של PVAR ומזהים תופעה של מומנטום בצבירות ובתשואות של קופות הגמל, ורדיפה של משקיעים אחר תשואות קצרות טווח. כמו-כן, אנו מוצאים השפעה חיובית של הצבירות בקופות הגמל על תשואותיהן קצרות-הטווח. אנחנו מחלקים את המדגם לשלוש תת-תקופות – לפני המשבר הפיננסי הגלובלי, תקופת המשבר והתקופה שלאחר המשבר – ומאשרים את הממצאים העיקריים גם עבור תתי-התקופות. ממצאים נוספים מעלים את ההשערה שהקשר בין תשואות וצבירות בקופות-הגמל בישראל מושפע מסיכון הקופה ומדמי הניהול שהיא גובה.

## **1. Introduction**

Provident fund is a general name for a group of pension savings instruments for the medium and long run. We would like to concentrate on 'pension payment's provident funds' ('kupot gemel'), and in particular on 'allowance and compensation funds'. The investor in such a fund can be either self-employed or an employee, in which case the employee and the employer put equal amounts of money into the fund. The major benefit provident funds offer savers is a tax exemption.

Recent reforms in Israel's pension system, the most prominent of which being the Bachar committee, enabled savers to move between provident funds without great difficulty. Notwithstanding the advantages of the newly fierce competition, it also led to the highlighting of yields and in particular short-term yields, frequently at the expense of equally important measures such as risk.

The 2008-2009 Financial crisis served as a warning sign of the new pitfalls in the provident fund market. Provident funds, which had large holdings of risky assets, suffered significant losses and investors spooked by market turmoil, moved money away from provident funds. The new ease of movement within funds and between pension saving vehicles led to investors first chasing returns and then flying to safety at all cost. Those trends have been reinforced by the funds' marketing which focused on the funds' short-term results, rather on their long term attributes. The fact that most of the money in provident funds is pension savings has been sidelined by investors and fund managers alike.

We use Panel VAR, a methodology novel to the field of investment research, to explore whether Israeli savers engage in return chasing and whether they are aware of the cost of those returns as they are reflected in provident funds' management fees and risk. We conclude that investors tend to move between funds based on the funds' short term Yield and Inflow, and they take the funds' fees and risk into account when doing so.

This paper is organized as follows. Section 2 examines literature on investor behavior. Section 3 describes the pension saving environment in Israel. Section 4 describes the data. Section 5 details the PVAR methodology. Section 6 presents the results, Section 7 analyzes those results and Section 8 concludes.

## **2. Investors' behavior and yields**

### **2.1 Investors in Mutual Funds and Pension Funds**

Little research has been done on the behavior of investors in provident funds, due to the unique nature of this savings instrument. We believe, however, that the behavior of these

investors is likely to resemble the behavior of households investing in the capital market in general and through mutual funds and pension funds in particular<sup>1</sup>.

Ippolito (1992) uses pooled regression and fixed-effects models on yearly data and finds that a fund's past performance affects its current inflow. Ippolito also shows that current performance is positively correlated to past performance, hence rewarding the investors' yield chasing behavior. He doesn't find conclusive evidence as to whether investors concentrate on funds' past yield or on its past risk-adjusted yield. Ippolito shows that investors react in asymmetrical ways to funds' past yields: They invest in winning funds more rapidly than they leave losing funds<sup>2</sup>.

Edelen (1999) claims that flows into/out of open end mutual funds can cause liquidity trading by the fund, which in turn will cause losses, reducing its return. He uses both the monthly positive and negative flows as a proxy for the funds' liquidity motivated trading. Edelen runs a regression aimed at explaining abnormal returns by liquidity-motivated trading and information-motivated trading. He addresses the endogenous nature of flows with respect to returns by adding lagged abnormal returns to the equation and by using lagged flows as an instrument for current flows. Edelen finds that liquidity-motivated trading significantly reduces the fund's net abnormal return, and even its gross abnormal return (which unlike the net return is unaffected by additional trading costs caused by the liquidity-motivated trading). This finding is true for both inflows and outflows, as well as the combination of the two flows.

Wermers (2003) findings are not in line with Edelen (1999). He finds that a fund's inflows enhance its returns and vice-versa. Wermers shows strong persistence in mutual fund returns over the years. He suggest the following string of events: last year's returns attract investors, the managers of the 'winning funds' use the large inflows to invest in momentum stocks and the latter outperform the market not only due to the momentum factor, but also because of the positive flows themselves. This process enables 'winning funds' to outperform other funds for at least two years following the ranking year.

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<sup>1</sup> Hereafter, we focus on papers studying how flows of money into a specific fund affect its yield and vice-versa. Macro papers which investigate how the aggregate flows of money affect the market price level and vice-versa include Warther (1995), Fant (1999), Cha and Kim (2010) and Ben-Rephael, Kandel and Wohl (2009, 2010).

<sup>2</sup> While Ippolito (1992) explains this phenomenon as pure irrationality, Goetzmann and Peles (1997) suggest an interesting psychological explanation of cognitive dissonance: investors adjust their beliefs to support past decisions. They claim that investors display a positive bias in their recollection of past fund performance and this bias hinders them in taking their money out of losing funds. Sirri and Tufano (1998) suggest yet another explanation: they claim that search costs are the cause of the asymmetry. Sirri and Tufano show that funds that receive greater media attention and belong to larger management firms grow faster than other funds, and that the performance-flow relationship is stronger for funds with higher marketing effort (as measured by high fees). They claim that all of those factors act to reduce the consumers' search costs.

Nanda, Wang and Zheng (2003) exploit a natural experiment of funds introducing multiple share classes in order to examine the effect of positive inflows on fund performance. Their results are in line with Edelen's: They show that the positive inflows result in a significant deterioration in fund performance which the authors ascribe to liquidity costs and decreasing returns to scale. The drop in performance in turn, leads to a drop in inflows. They claim that these results might explain the empirical evidence showing that performance persistence and smart money effect are short lived: As investors chase past returns, the increase in the volatility and level of fund cash flow would tend to equalize the expected abnormal returns across funds.

Benson, Faff & Smith (2007) show that the relation between fund return and flows is both contemporaneous and endogenous. Using a simultaneous equation model, they find that current flows have a negative impact on returns whereas lagged flows have a positive impact. The researchers also find that both current and lagged returns have a positive impact on flows. In addition they show that both the fund's age and its expenses have a negative impact on the fund's flows. Benson, Faff & Smith infer that fund managers find it difficult to place large inflows quickly or to deal with large requests for outflows (though in the outflows case the yield jumps temporarily due to the sale of low yield assets), while investors are quick to recognize high performing funds and move their money accordingly.

Rakowski and Wang (2009) study mutual funds daily data using a Vector Auto Regression approach. They estimate a VAR model with 5 lags for each of the funds in their sample, and use the percentage of funds showing positive/negative significant results in order to reach conclusions regarding the entire population. The researchers show that investors tend to move money to funds that performed poorly in the previous days which they interpret as evidence of more mutual fund investors following a strategy consistent with short-term contrarian behavior than with momentum behavior. Rakowski and Wang also show that past flows have a positive impact on future returns and that this impact decreases in significance as the lags increase, which they interpret as consistent with a long-term information effect, dominating the transient price pressure effect. The results also suggest that daily fund returns show a large degree of positive autocorrelation, while daily flows demonstrate negative autocorrelation. When using monthly data most of the above-mentioned patterns disappear.

All of the above-mentioned papers deal with mutual funds. Provident funds however, are very different from mutual funds when it comes to investment horizon. In order to enjoy the tax exemption (which is the main advantage of provident funds over alternative investments such as mutual funds), money invested in a provident fund must be saved either until the investor reaches retirement age or until at least 15 years have passed since the money was first invested in a provident fund (money invested before 2008, following the previous, more lenient regulations). This feature makes provident funds closer in many aspects to pension

funds than to mutual funds. A typical provident fund customer invests his/her money for the long term, therefore resembling the typical pension fund customer.

Del Guercio and Tkac (2002) investigated the differences in flow – performance relations between mutual funds and pension funds. They find that savers in pension funds are more likely than mutual fund investors to use risk-adjusted performance measures in evaluating managers. The shape of the flow-performance relationship is also greatly different between the two types of funds: While the mutual fund flow-performance relationship was found to be highly convex (consistent with previous research), the flow-performance relationship was found to be approximately linear in the pension fund segment. This means that 'the winner takes all' phenomenon and 'investors not punishing losers as much as they reward winners' phenomenon, which have been documented in the mutual funds market, do not characterize the pension fund market. Del Guercio and Tkac findings suggest weaker incentives for pension fund managers to take excessive risks compared with mutual fund managers<sup>3</sup>. In addition, the researchers find that in contrast to the high degree of autocorrelation in mutual fund flows, pension fund flows exhibit very low autocorrelation.

## **2.2 Investors' behavior and yields in provident funds in Israel**

Our paper is related to a small body of literature regarding provident funds in Israel. Blass (1996) in a preliminary paper utilizes data from the MOF and focuses on Allowance and Compensation provident funds. He shows that the provident funds' yields in the years 1987-1994 were lower than those attainable in the market and explains it by poor market timing in the selection of investments channels and by low performance compared with the relevant benchmark indices. The lower yields were not compensated for by lower risk. Blass offers a number of possible explanations for those disappointing yields<sup>4</sup>: too many transactions which led to high transaction fees, high management fees, tendency to buy securities based on past yields, tendency to buy securities based on other provident funds' purchases (herd behavior), conflicts of interest which led to sub-optimal investment decisions, inconsistent investment strategies and investment in mutual funds which led to the customer effectively paying multiple management fees.

Following various studies which showed a high degree of centralization in the bank run Israeli capital market, which resulted in a stunted non-bank credit market, high management

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<sup>3</sup> Chevalier and Ellison (1997) estimate the shape of the flow-performance relationship for a sample of mutual funds and infer that this shape creates incentives for fund managers to increase or decrease the riskiness of the fund in a way which may not benefit the investors. They also show that mutual funds indeed alter the riskiness of their portfolios at the end of the year in a manner consistent with these incentives.

<sup>4</sup> It is worth mentioning that in a study on mutual funds in Israel, Lauterbach and Barak (2002) find significant negative abnormal yield which they attribute to high management fees.

fees relative to the performance of mutual & provident funds and conflicts of interest, the Bachar committee was formed. The committee recommended that commercial banks in Israel should not be allowed to manage mutual & provident funds and should instead focus on distribution and customer counseling regarding these instruments. The mutual funds were sold quickly, as opposed to the provident funds whose sales were slower.

Blass (2007) examined the funds' performance in the years 2000-2005. He studied the performance of the bank-held and non-bank-held provident funds in the years 2000-2005 using data from the Capital Markets Department at the MOF. Blass shows that the funds' annual yields were low relative to a benchmark of 20% stocks and 80% bonds. Blass finds that a 1% rise in the stock market leads to a rise of approximately 0.25% in fund excess returns. A central conclusion from the regression is that the yields of the private funds were higher, but this gap shrank after deducting management fees. The results strengthen the conclusion from Blass's previous paper regarding provident funds' negative excess returns on the market and they show that although the private funds had negative excess returns, they still performed better than the bank-held funds<sup>5</sup>. In addition, Blass finds that there is no persistence in provident fund excess returns, which means that one cannot "pick winners"<sup>6</sup>.

The paper on provident funds most related to our work is Horesh and Rahman-More (1999). Horesh and Rahman-More study the effect of provident funds' yields on their flows, using monthly data on one provident fund which amounted to 15% of the provident fund market in the sample period (10/1993-01/1997). The dependent variable is the fund's net inflows (inflows-outflows) and the explanatory variables are the fund's (price level adjusted) two month lagged yield, its change relative to the three month lagged yield, alternative yield variables (the 'Makam' yield, bank deposit yield and medium-term government bond yield) and the 6 month standard deviation of the fund's yield, which represents the fund's risk. Horesh and Rahman-More use a simple auto-regression model and find that higher two month lagged fund yields and greater changes in two month lagged fund yields lead to significantly higher inflows, while higher yields of alternative investments lead to higher contemporaneous outflows. The volatility of the fund's yield, as measured by its 6 month standard deviation, was found to have no explanatory power on the fund's flows. In addition, the researchers find that the average yield of the fund in the six previous months has no effect on its flows, reinforcing their inference that the fund's investors are overly influenced by short-term returns

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<sup>5</sup> Blai (2003) compares the performance of bank-held flexible mutual funds to those of their privately-held counterparts. She is unable to find significant difference in the returns, though it seems that privately-held funds show better market timing, while bank-held funds demonstrate better selection abilities.

<sup>6</sup> Lauterbach and Barak (2002) do find persistence in mutual fund returns which justifies investors' yield chasing behavior. Gruber (1996) show similar results for mutual funds in the U.S.

and do not pay enough attention to the fund's risk and long term performance. Though interesting, Horesh and Rahman-More's paper suffers from a limited focus, concentrating on only one fund and solely on the effect of the fund's return on its flows, while neglecting the opposite channel. This lack elides a more serious problem - we believe that the fund's yield and flow might be determined simultaneously; hence using a simple least-squares regression to study the effect of yields on flows might lead to erroneous conclusions. We will try to address this problem in the coming sections.

### **3. The current situation in Israel and its problems**

#### **3.1. Pre-crisis developments**

The pension system in Israel is composed of pension funds, insurance programs and provident funds. Provident funds are a saving instrument which is unique to Israel and they are a hybrid vehicle which combines features of a pension fund and of a mutual fund. In the past few years, however, the regulator has taken several steps aimed at lengthening the saving horizon of provident funds and equalizing their terms to those of the other saving vehicles, hence bringing the provident funds closer to pension funds.

In recent years there have been several reforms in Israel's pension savings.

- The Bachar committee of 2005 compelled the transfer of ownership (by selling over a period of several years) of mutual funds, pension funds and provident funds from the banks to private bodies, mostly insurance firms and financial investment firms.
- The Mandatory Pension Law, which went into effect at the beginning of 2008, expanded pension saving to the entire working population, resulting in inflows to the pension market, mostly to pension funds and life insurance programs.
- The equalization of terms between the three long-term savings paths: In 2008 the taxes on saving through pension funds, provident funds and life insurance programs were equalized, as were the channels by which savers could get their money upon retirement (means-tested regulation of lump-sum payments).
- The new 'financial services regulations' of 2008 enabled savers to move their money from one saving path to another as well as from one saving firm to another with relatively few difficulties.

Those reforms created a far more competitive market in which savers are able to transfer their savings between different savings paths, including but not limited to provident funds, and between different management firms. Savers who choose to save through provident fund



are able to choose their provident fund from a large variety of funds<sup>7</sup> and move relatively effortless between funds during the entire saving period<sup>8</sup>. However, the savers may lack the knowledge and information to make an informed decision. Every fund advertises, highlighting its short-time yields and the savers have a hard time making the right decision. The long run savers may be tempted with short-term yields which might come on account of increased risk that will likely be realized later on.

The Bachar committee suggested one way of dealing with the new problems by enabling the banks to provide pension consulting. All the major Israeli banks, as well as some smaller non-bank firms, received pension consulting licenses during the years 2007-2009, giving savers new opportunities for objective pension consulting, but at a cost: The savers asking for a consultation have to either pay for it directly or pay for it indirectly through higher management fees, due to a fixed distribution fee paid to the consulting firm. (this is the model adopted by the banks).

The fact that people of all ages and risk preferences use provident funds as a major investment vehicle is inherently problematic. In order to tackle this problem the MOF has decided to adopt IRA- Individual Retirement Accounts - which are suited for relatively sophisticated investors, and a Multi-fund pension system, which is aimed towards the general population. Shipenbawer (2007) offers an international comparison of multi-fund pension systems, which were adopted, among others, by Sweden, Estonia, Peru, Latvia, Slovakia and Chile. The multi-fund pension is a new product aimed at offering the fund's customers a variety of saving options suitable for different age groups. The idea is that the customer will be able to choose the appropriate risk level according to his age and level of risk aversion. The increase in consumer choice should improve decision making optimization at the individual level and lead to a better equilibrium at the economy level.

As for Israel, Shipenbawer mentions that the scope of publicly available data has increased rapidly in recent years due to several factors, including the development of the 'Gemel-Net' and 'Pensia-Net' systems, which give the public access to monthly data on Provident and pension funds. Nevertheless, the proportion of assets invested in multi-fund provident funds remains static at approximately 2% of assets invested in provident funds on average, though those funds account for one third of the total number of provident funds in Israel and offer a variety of saving paths. The author concludes that public involvement in choosing the savings

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<sup>7</sup> This large variety of funds might be too much for the simple saver who needs to choose where to put his/her life savings. The legislature responded to this problem in 2009 by changing the financial services law, forbidding firms from running more than one provident fund of each type.

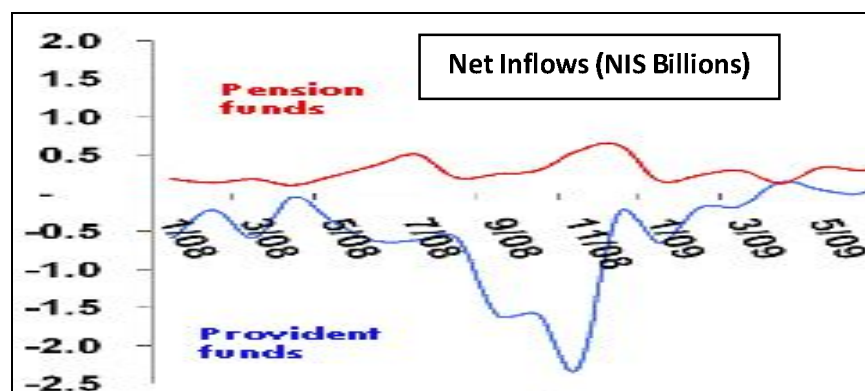
<sup>8</sup> E.g: in the year 2008, after most of the above-mentioned reforms, money transfers between saving bodies went up 40%, most of which was transfers between provident funds.

path and public understanding of the subject need to increase simultaneously. Shipenbawer emphasizes the importance of adjusting savings to the saver's personal status and age.

### 3.2. Post-crisis reactions

The liberalization and development of capital markets in Israel enabled provident funds to take high risks and, more importantly for them, obtain high yields. Funds used the high yields as a mean of attracting new money, thus making larger profits through management fees. Many of the funds utilized their new-found freedom to buy high-yielding corporate bonds, which carried high risk.

The global financial crisis caught most of the provident funds off-guard. The annual report of the Commissioner of Capital Markets, Insurance and Savings (2008) explains that the provident funds were hit especially hard for several reasons: a much larger percentage of their funds could be withdrawn without a fine/tax penalty; 37% of their assets were corporate bonds, which dropped precipitously when the crisis began due to concerns as to the stability of many firms; unlike pension funds they did not own a significant amount of 'designated bonds'<sup>9</sup>; a large portion of their inflows come from the self-employed who deposit money at the end of the year and may have deposited less money during the crisis. The result was that provident funds suffered larger net outflows compared with pension funds and they responded by selling their riskier assets and buying safer assets:



Source: Information and Statistics division, Bank of Israel

The MOF responded to the immediate threat of a 'run on the fund' by offering a safety net for savers close to retirement age, who at the peak of the crisis seemed unlikely to be able to make up the lost money in the few years they had until retirement.

On 24.3.2009 Yadin Antebi, the Commissioner of Capital Markets, Insurance and Savings at the MOF, announced the department's new plan for regulating provident funds, following the recent crisis (Antebi 2009). The plan included not only the implementation of a multi-fund

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<sup>9</sup> Bonds which the Israeli government issues for certain types of pension funds and which carry relatively high yields

pension system and IRA, but also cutting down the number of possible saving paths, a prohibition on the advertising of short-term (less than 12-month) yields by institutional investors, obligatory reporting of the management fees in the quarterly report sent to the institutional investors' customers, the standardization of customer service guidelines among institutional investors, ex-ante publishing of the institutional investors' investment policy, alignment of the investments' managers compensation to the long-term performance of the fund/insurance company, limitations on the institutional investors' investments in corporate bonds, strengthening the risk management, control and supervisory mechanisms in institutional investment bodies, an increase in minimum capital requirements and further limitations on institutional investors' investments.

## **4. The Data**

### **4.1. Data sources and observations**

We conduct an empirical study aimed at understanding both the connection between Israeli provident funds' yields and their Inflows and the connection between the fund's past yields and their future yields. In addition we try to understand how the funds' management fees, risk and size affect that connection, and to see if investors take those fees and risks into account when they make investment decisions.

We utilize data from the Israeli Ministry of Finance's (hereafter MOF) 'Gemel-Net' provident funds' data system. The Gemel-Net system contains data on all Israeli provident funds. This data includes: yields, withdrawal, deposits, transfers, net Inflows and total assets on a monthly base, as well as asset composition and management fees on a yearly base. We also collect monthly data on the funds' management fees, asset composition and deposits by employees/self-employed from the Bank of Israel's 'KLGEMEL' system.

Our sample period is 01/2003 to 06/2010, inclusive. In this 90 month period, after the data restrictions discussed in section 4.3, we have a sample of 21,594 monthly observations of 364 provident funds which belong to 85 management firms. This is an unbalanced panel - a fund can enter the sample after 01/2003 or leave the sample prior to 06/2010.

### **4.2. Variables**

We use a fund's total assets at the beginning of each month as a method of normalizing all variables to the fund's size:

**Fund Assets**  $_{i,t}$  = total assets of fund  $i$  at the beginning of month  $t$ .

Our two main dependent variables are the provident funds' net Inflow and the provident funds' gross yield, both normalized by the fund's total assets at the beginning of the month. Other dependent variables are variations on these variables.

**Inflow**<sub>i,t</sub> = (deposits in fund i in month t - withdrawals from fund i in month t + net transfers to fund i in month t)/Fund Assets<sub>i,t</sub>

**Transfers**<sub>i,t</sub> = net transfers to fund i in month t / Fund Assets<sub>i,t</sub>

**Fund Yield**<sub>i,t</sub> = fund i percentage yield in month t as calculated by the MOF from fund i daily reported yields.

We use several measures of fund characteristics:

**Risky\_Assets**<sub>i,t</sub> = the share of the fund's assets which are risky<sup>10</sup>

**Management Fee**<sub>i,t</sub> = The yearly management fees collected by fund i in the year in which month t appears as a percentage of fund assets/number of months in which fund i was active in the year in which month t appears.

Management fees are collected on a monthly basis. The monthly data is not available to savers and according to provident fund market participants and officials at the MOF the variations in the monthly data are generally unrelated to changes in the management fee level. We therefore decided to use the accumulated yearly management fees data from the 'Klgemel' system which we converted into monthly terms. We searched for outliers and when possible corrected them using the monthly data from the 'Klgemel' system. Upon encountering zeros we double-checked the data vs. the 'Gemel-net' system and if the 'Gemel-net' data was different from zero we used the 'Gemel-net' data<sup>11</sup>. It is important to notice that using monthly management fees which are based upon the annual management fees reduces the variance of this variable across the sample: we lose most of the between period variance, but maintain the cross-sectional variation within each period.

### 4.3. Data Restrictions

We restrict our sample to the years 2003-2010 for reasons of data availability and coverage. We limit our sample to Allowance and Compensation funds as those are the funds in which the individual savers are the account holders and not their employers. We also drop sub-types of Allowance and Compensation funds that have significantly different characteristics: funds that promise specific yield levels ('Mavtihat Tsuah'), IRA funds ('Nehul Ishi') and Mutual Insurance funds which are mismarked in the data as Allowance and Compensation funds.

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<sup>10</sup> We define the following assets as risky: Stocks, Corporate Bonds, Foreign Bonds, Loan & Mortgage Portfolios, Convertible Assets, Real Estate, Structured Assets, Futures, Options, Mutual Funds, Stock ETFs, Bond ETFs and unclassified assets. We define the following assets as not risky Government bonds, Cash and Cash Equivalents, Treasury Bills and Bank Deposits. We take the assets in absolute values, counting short positions as adding to the firms' risk as much as long positions. This variable is capped at 1% and 100%.

<sup>11</sup> Zero management fees are a possible outcome, usually a feature of provident funds which serve only a single organization and are managed by this organization.

To avoid a dominant effect of extreme observations (outliers) on the results we apply a 1% two-sided (0.5% of each side of the distribution) trim to Inflow. We believe the dropped observations are primarily composed of fund mergers and acquisitions<sup>12</sup> (Inflows of 1000s of percent a month) and fund closures (Inflows of negative 80-100 percent a month). A comparison of the main variables before and after the trim appears in Appendix Table 1. The table highlights the resemblance between the variables before and after the trimming, with the exception of the Inflow and Transfers variables. We examine results from the untrimmed sample in our robustness checks.

We decided to concentrate on provident funds of significant size only and therefore dropped funds that did not have assets above 10 Million NIS at least once in sample, similar to the restriction used in Blass (2007). Specifically, a fund enters the sample when it reaches or passes 10 Million NIS and only the subsequent observations are included in the sample.

The first six months of each fund's existence are not included in the sample, as this period tends to be both extremely volatile in terms of inflows and not representative of fund behavior in general.

#### 4.4. Summary statistics

Table 1 presents summary statistics for the raw variables: Deposits, Withdrawals, Fund Transfers, Fund Inflow and Fund Assets, and for the normalized variables: Inflow and Transfers.

Table 1: Monthly Inflow and Asset Summary Statistics						
	mean	median	sd	min	max	N
Deposits	2,144	430	7,303	-7,300	376,080	21,594
Withdrawals	2,715	460	9,671	-270	273,500	21,594
Fund Transfers	-216	-20	13,296	-360,350	499,740	21,594
Fund Inflows	-787	-40	17,556	-552,650	495,620	21,594
Fund Assets	556,526	132,005	1,683,187	-	21,700,000	21,594
Inflows	1.01%	-0.06%	6.83%	-27.25%	139.15%	21,594
Transfers	0.97%	-0.01%	6.36%	-30.96%	125.64%	21,594

\*The figures for all but Inflow and Transfers are in 000's of NIS.

Figure 1 presents the Deposits, Withdrawals, Fund Transfers and Fund Inflow variables (Fund Inflow is calculated as Deposits- Withdrawals+ Fund Transfers). The peaks in the deposits chart show the annual surge in deposits in December, a technical phenomenon known as the 'December effect', which results in part from the self-employed making deposits at the end of the year. The chart highlights the decline in Inflows, resulting mainly from the

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<sup>12</sup> This conclusion is a result of conversations with officials at the MOF and the examination of a limited number of outliers, as our data does not allow us to identify mergers and acquisitions specifically.

decline in net transfers following the markets' tumble after the collapse of Lehman Brothers. The decline in the average net transfers is the result of investors moving their money away from provident funds and into other investment vehicles.

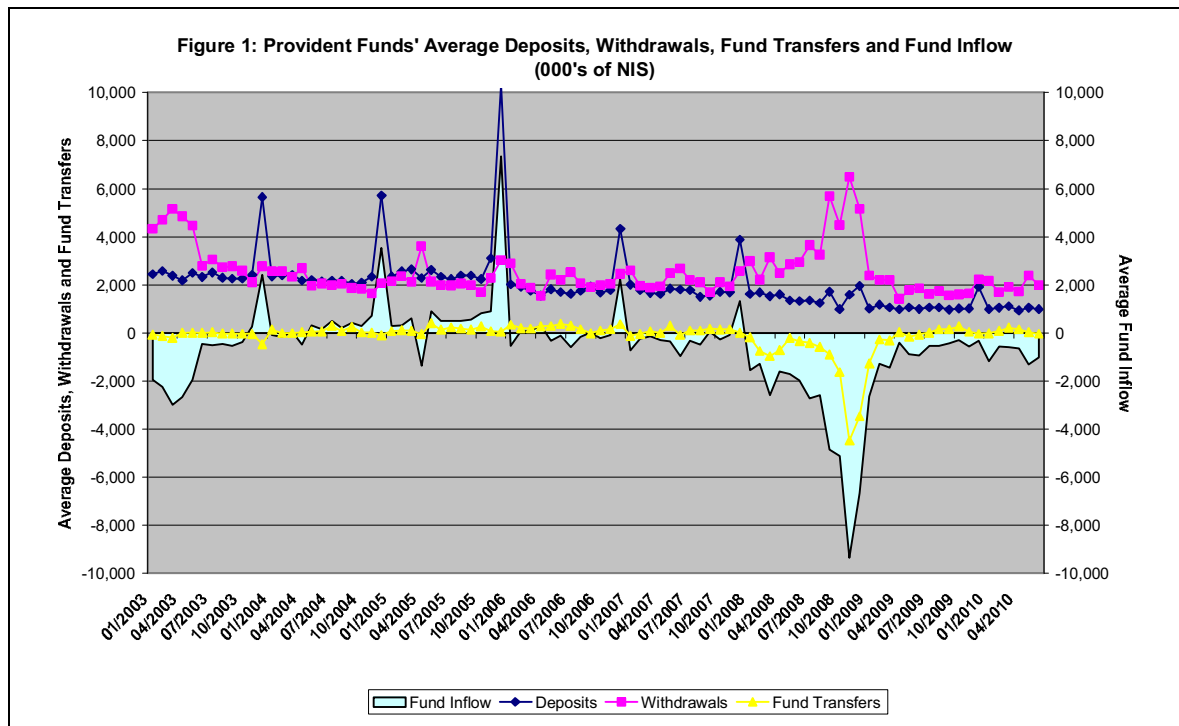
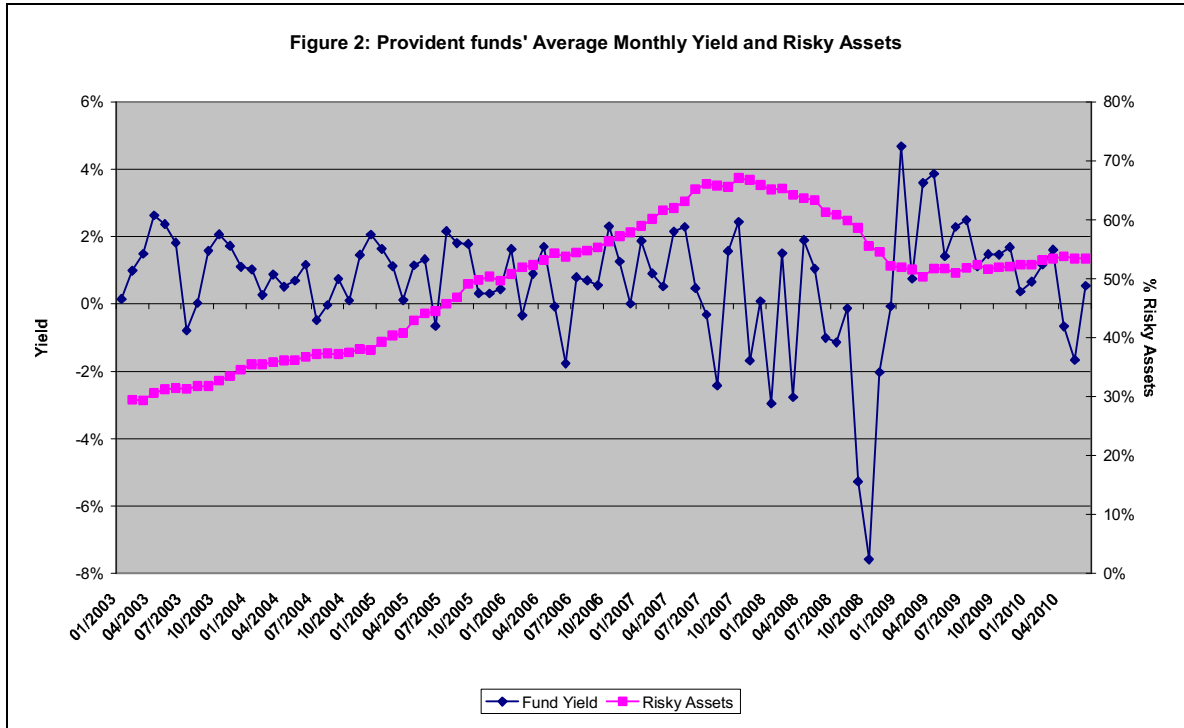


Table 2: presents summary statistics for the Yield, Risky Assets and Management Fee variables:

Table 2: Monthly Yield, Risk and Management Fee Summary Statistics						
	mean	median	sd	min	max	N
Fund Yield	0.60%	0.76%	2.30%	-22.22%	19.35%	21,594
Risky Assets	51%	53%	24%	1%	100%	21,570
Management Fee	0.08%	0.08%	0.04%	0.00%	0.34%	17,164

Figure 2 presents the Fund Yield and Risky Assets variables. The Chart highlights the decline in Yields following the markets' tumble after the collapse of Lehman Brothers, which was followed later on by a weaker surge. The Risky Assets rose steadily until the end of 2007, when signs of a financial crisis began to appear, dropped until the beginning of 2009 and stabilized from then on.



The sample period is differentiated from other periods by the global financial crisis which had an exceptional influence on the financial markets as well as on the real economy. The main phase of the crisis began with the collapse of Lehman Brothers in September 2008. The markets' recovery, though not the real economy recovery, started in March 2009. The crisis' influence on the financial markets and the response of investors worldwide in general, and of provident funds' savers in Israel in particular, may affect our results. In order to deal with this issue, we divide the sample into three periods: Before the crisis (01/2003-08/2008), the peak of the crisis (09/2008-02/2009) and the aftermath of the crisis (03/2009-06/2010). Table 3 and table 4 present the summary statistics separately for the three periods:

Table 3: Monthly Inflow and Asset Summary Statistics - 3 Periods						
	Pre-Crisis					
	mean	median	sd	min	max	N
Deposits	2,570	540	8,437	-7,300	376,080	14,862
Withdrawals	2,772	440	9,347	-210	182,010	14,862
Fund Transfers	-50	-10	10,830	-188,260	219,380	14,862
Fund Inflow	-252	-20	13,993	-231,020	261,440	14,862
Fund Assets	599,005	135,340	1,796,104	960	21,700,000	14,862
Inflow	1.16%	-0.02%	6.62%	-27.25%	118.53%	14,862
Transfers	1.00%	-0.01%	5.99%	-30.96%	121.27%	14,862
	Crisis					
	mean	median	sd	min	max	N
Deposits	1,474	300	5,064	-3,810	135,790	1,729
Withdrawals	4,603	800	17,137	-	273,500	1,729
Fund Transfers	-2,390	-370	30,772	-360,350	499,740	1,729
Fund Inflow	-5,519	-670	42,036	-552,650	495,620	1,729
Fund Assets	436,391	114,210	1,298,579	1,990	18,000,000	1,729
Inflow	1.12%	-0.92%	11.38%	-27.03%	139.15%	1,729
Transfers	1.68%	-0.37%	11.26%	-25.98%	125.64%	1,729
	Post-Crisis					
	mean	median	sd	min	max	N
Deposits	1,111	250	2,847	-5,070	67,270	5,003
Withdrawals	1,891	430	6,389	-270	102,570	5,003
Fund Transfers	41	-10	9,261	-105,120	65,490	5,003
Fund Inflow	-739	-40	11,388	-159,000	65,480	5,003
Fund Assets	471,852	126,130	1,430,274	-	20,300,000	5,003
Inflow	0.52%	-0.06%	5.15%	-25.15%	53.42%	5,003
Transfers	0.64%	-0.01%	4.90%	-23.30%	50.42%	5,003

\*The figures for all but Inflow and Transfers are in 000's of NIS.

It is noticeable that although negative throughout the sample period, the average fund's Inflows were much lower during the financial crisis, with an average fund losing more than 5.5 million NIS in assets each month between 09/2008 and 02/2009. Those negative net Inflows resulted mostly, as we saw in the above chart, from large transfers to other long-term investment vehicles.



Table 4: Monthly Yield, Risk and Management Fee Summary Statistics - 3 Periods						
	Pre-Crisis					
	mean	median	sd	min	max	N
Fund Yield	0.62%	0.71%	1.65%	-13.17%	9.93%	14,862
Risky Assets	50%	51%	23%	1%	100%	14,858
Management Fee	0.06%	0.06%	0.05%	0.00%	0.34%	12,816
	Crisis					
	mean	median	sd	min	max	N
Fund Yield	-1.54%	-0.52%	4.94%	-22.22%	19.35%	1,729
Risky Assets	54%	58%	24%	1%	100%	1,725
Management Fee	0.09%	0.09%	0.04%	0.00%	0.22%	1,715
	Post-Crisis					
	mean	median	sd	min	max	N
Fund Yield	1.30%	1.15%	2.07%	-9.66%	15.26%	5,003
Risky Assets	52%	58%	26%	1%	100%	4,987
Management Fee	0.09%	0.09%	0.04%	0.00%	0.17%	4,967

Table 4 shows that the funds' yields dropped significantly during the crisis, with the average provident fund yielding approximately -10% from 09/2008 to 02/2009. This may seem mild compared with the scope of the crisis, but for many savers, seeing their pension savings drop by 10% or more within half a year was too much, and as we saw above many of them moved their money elsewhere. The yields improved significantly from March 2009, enabling more patient savers to make up for the money they lost.

## 5. Panel-data Vector Auto-Regression (PVAR) Methodology

Our goal is to determine if fund Inflows are a function of fund Yields, if fund Yields are a function of fund Inflows, and how fund characteristics affect those variables. We examine both lagged and contemporaneous relationships. We use the Panel VAR method to take full advantage of both the time-series and the cross-sectional variation while solving the endogeneity problems.

Until October 2009 provident fund monthly yields were published on the 'Gemel-net' system by the Capital Market, Insurance and Savings department at the MOF between the 17th and the 20th of following month, based on reports submitted by the funds on the 15th. Several of the financial newspapers published estimates of these yields at the beginning of each month, with a fair degree of accuracy. Regulations promulgated by the same department require that transfers between pension saving instruments be carried out within 20 business days of the transfer request<sup>13</sup>. As fund yields are available only with a lag, fund Inflows

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<sup>13</sup> 20 business days is the maximum permissible period for inactive savers. For active savers the 20 business days' count starts only at the first deposit to the fund receiving the money. Until 2008 transfers were allowed only between pension saving instruments of the same type. Transfers between provident funds were carried out within 7 business days.

cannot be contemporaneously caused by fund yields. Fund yields, however, can be affected contemporaneously by fund Inflows as the money received can be invested at once. In September 2009 the department promulgated new regulations forbidding provident funds from advertising yields shorter than a year and ceasing publication of the same on 'Gemel-net'. While monthly yields can be derived from the data on 'Gemel-net', they are no longer easily accessible.

We explain fund yields by, among other things, contemporaneous inflows, since those funds can be used for investment immediately. Since Inflows today are influenced by yields in the past, we have a possible endogeneity problem. Many papers in the field have ignored this problem (e.g. Ippolito (1992), Horesh and Rahman-More (1999) ), In order to address this concern, we use the Hausman test for endogeneity (Hausman(1978)). Using the Hausman test we reject the null hypothesis that OLS is efficient and consistent at the 1% level, establishing the apprehension of an endogeneity problem. Several recent papers have identified this issue and responded by using 2SLS (Benson, Faff and Smith, 2007) or VAR (Rakowski and Wang, 2009). While these methods represent an improvement over previous efforts, we believe that the Panel VAR method makes better use of the entire scope of the data. Rakowski and Wang's VAR aggregation method does not make full use of the cross-sectional data and while 2SLS is similar to Panel VAR, the latter enables us to focus on the dynamic aspects of the model.

We use a Panel-VAR (PVAR) structure which combines the traditional VAR approach with the panel-data approach. Thus we both treat all the variables in the system as endogenous and allow for unobserved individual heterogeneity. The PVAR system enables us to capture the interactions between the leads and lags, and between the funds' yields and Inflows. As far as we are able to determine, this is the first paper that uses the PVAR approach to model the relationships between Inflow and Yield. While breaking new ground in this respect, we are able to build on a small, though growing, body of literature utilizing PVAR for other purposes. Those papers include, among other, Love and Zicchino (2006), Coad (2007), Dramance (2009), Assenmacher-Wesche and Gerlach (2008) and Agnello and Sousa (2010). Specifically, we will examine the following model:

$$\begin{bmatrix} Inflow_{i,t} \\ Yield_{i,t} \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} + \sum_1^n \begin{bmatrix} \beta_{11,n} & \beta_{12,n} \\ \beta_{21,n} & \beta_{22,n} \end{bmatrix} * \begin{bmatrix} Inflow_{i,t-n} \\ Yield_{i,t-n} \end{bmatrix} + f_i + d_t + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{bmatrix}$$

where  $\alpha_j$  is a vector of constants,  $\varepsilon_{j,t}$  is a vector of error terms, and  $n$  denotes the number of lags.

Our model allows for firm-specific fixed-effects,  $f_i$ , and time dummies,  $d_t$ , in order to control for unobserved firm-specific properties and to deal with seasonality issues, period-specific shocks and market returns respectively.

In order to use a PVAR, we first need to check the order of integration of the variables and insure that they are all of the same order. Most of the commonly used panel unit-root tests require balanced panels (Im, Pesaran and Shin (2003), Levin, Lin and Chu(2002)), however the Fisher test (Maddala-Wu(1999)) does not. We run the Fisher test for Inflow, transfers and fund yield. The null hypothesis of unit-root is rejected at 1% for all variables.

As in Ben-Rephael, Kandel and Wohl (2009, 2011), we use information criteria for lag-order selection. Specifically, we use the Akaike, Schwartz and Hannan & Quinn Information criteria and the final prediction error. We calculate these criteria for each of the funds in our sample and test up to 12 lags. The fund average of the 4 criteria was 3.3 lags, which led us to choose a 3 lag VAR.

One advantage of using the PVAR approach is that it increases the efficiency of the statistical inference. While estimation of firm-level VARs, as in Rakowski and Wang (2009), suffers from a small number of degrees of freedom due to the lack of available data, the PVAR can incorporate cross-firm differences into the model using fixed effects.

However, given the correlation between the fixed effects and the regressors (due to the lags of the dependent variables), the commonly used mean-differencing procedure produces biased estimates (Holtz-Eakin et al., 1988), in particular, when the time dimension is small (Nickell, 1981).

We avoid the drawback of the fixed effects estimator by following a two-stage procedure in which: (i) we use a forward mean-differencing approach (the 'Helmert procedure') that removes only the mean of all future observations available for each fund-month (Arellano and Bover, 1995); and (ii) we estimate the system by GMM, using the lags of the regressors as instruments, therefore, keeping the orthogonality between lagged regressors and transformed variables unchanged (Blundell and Bond, 1998). Given that the number of regressors is equal to the number of instruments, the model is "just identified" and the system GMM is equivalent to a two-stage least squares estimator applied equation by equation (Love and Zicchino, 2006). The time dummies are eliminated by subtracting the means of each variable calculated for each month.

In what concerns the impulse-response functions, we follow the Choleski decomposition of variance-covariance matrix of residuals<sup>14</sup>, and assume that yield adjusts immediately to shocks, while Inflow only reacts with a lag. This ordering of the variables in the system is based upon our knowledge of the timeline of provident funds' data: while the Inflow is available to the funds' managers for investment by the end of the relevant day, the investors

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<sup>14</sup> Choleski decomposition enables the isolation of the shocks of one variable to the innovations in another variable in the system, while holding all other shocks equal to zero. It does so by allocating any correlation between the residuals of any two elements to the leading variable among the relevant variables. This is equivalent to transforming the system in a recursive manner (Hamilton, 1994)

see the funds' yield with a lag of (at least) one month and are able to react to that yield even later. This specification allows for contemporaneous effects of Inflow shocks on yield, through the Choleski decomposition.

Our sample period lasts from 01/2003 to 06/2010, inclusive. As we explained in the descriptive statistics section above, this period was far from homogenous and contained three distinct sub-periods. Therefore we will estimate the model not only for the entire sample, but also for the three sub-periods.

## **6. Results**

### **6.1. General Results**

The model estimated is a Bi-variate PVAR with Inflow and Fund Yield as endogenous variables. In order to analyze the dynamic relationships between the variables, we construct the Impulse Response Functions presented in figure 3<sup>15</sup>. The Impulse Response Function shows the response of each variable in the PVAR to a 1 standard deviation exogenous shock to each variable, holding all other shocks at zero.

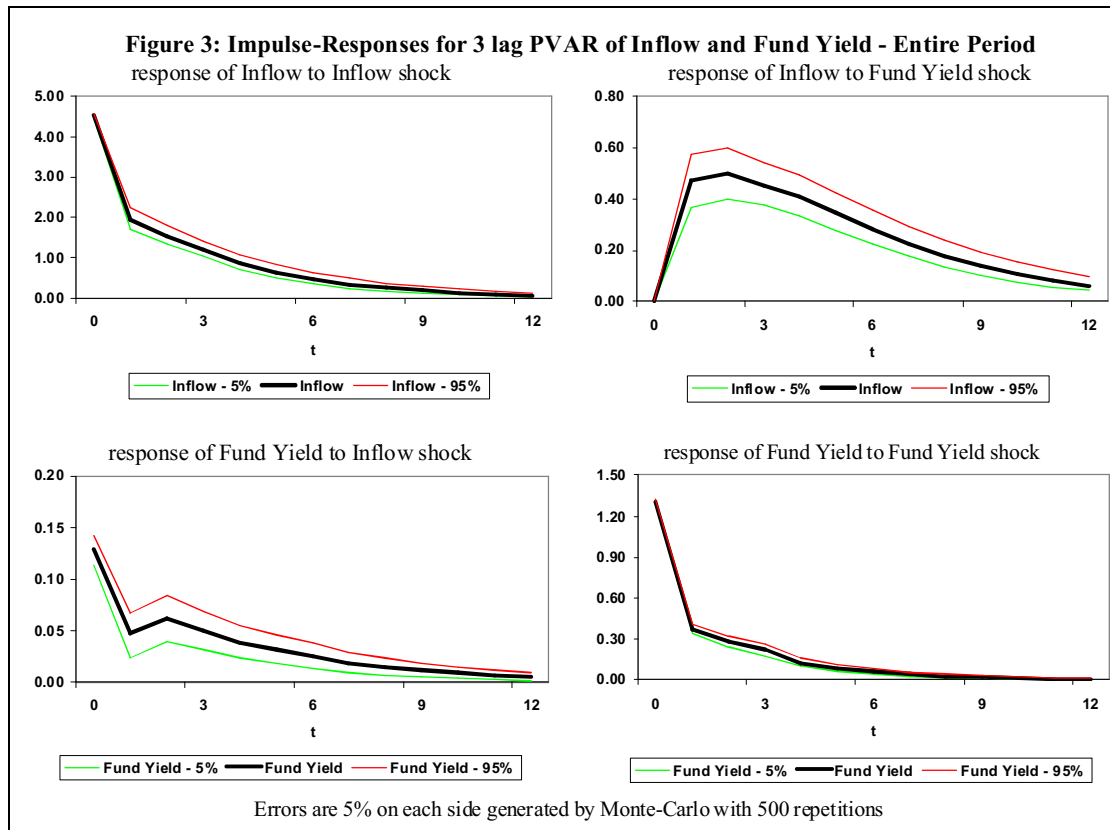
We see that there is strong persistence in Inflow; a shock to Inflow increases future Inflow for 12 months or more. Yield also exhibits high autocorrelation, with a shock to Yield positively affecting Yield for several months.

A shock to Yield causes significantly higher Inflow the next month. The effect shows strong persistence, with Inflow remaining significantly higher for over a year. The size of the effect is much smaller than that of an Inflow shock.

An exogenous positive shock to Inflow contemporaneously increases Yield. The effect decays fast, but it remains significantly positive for about a year. The size of the effect is much smaller than that of a Yield shock. Considering the results presented in Appendix Table 2, we can infer that while a shock to Inflow has a significant positive effect on Yield contemporaneously, the persistence of the Yield response is due more to Yield momentum than to an ongoing effect of lagged Inflow on Yield.

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<sup>15</sup> The Panel VAR coefficients and t-statistics are presented in Appendix Table 2



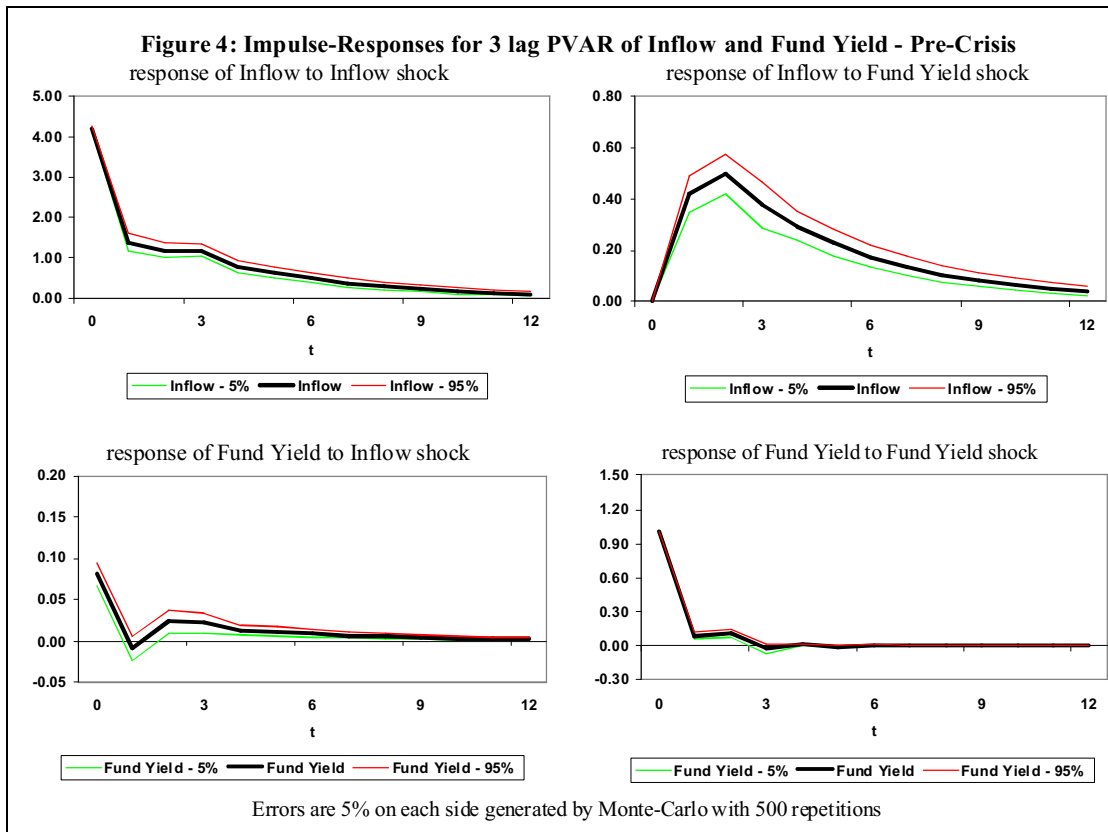
These results highlight the high persistent autocorrelation of both Fund Yield and Inflow, as well as the positive persistent effect of Fund Yield on Inflow and vice-versa.

## 6.2. Three Period Results

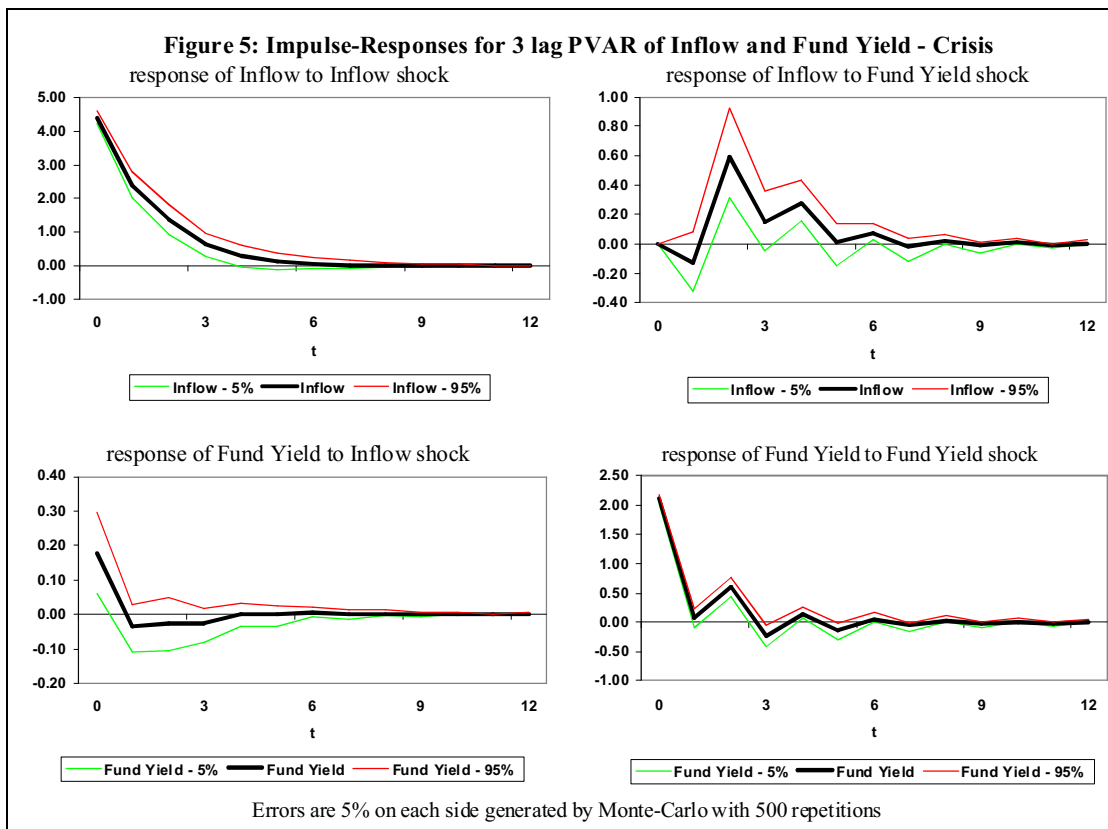
The above results treat our sample period as a homogeneous one within which investor behavior did not fundamentally change. The global financial crisis which happened in the middle of the sample does, however, raise doubts as to the validity of this assumption. In order to confirm the accuracy of the above results, we divide the sample into 3 periods and check to see if the connections between the variables remain the same. The three periods, as mentioned above, are: Before the crisis (01/2003-08/2008), the peak of the crisis (09/2008-02/2009) and the aftermath of the crisis (03/2009-06/2010).

We investigate by rerunning the model in the 3 periods. The Impulse response functions for the 3 periods are presented in figures 4-6.

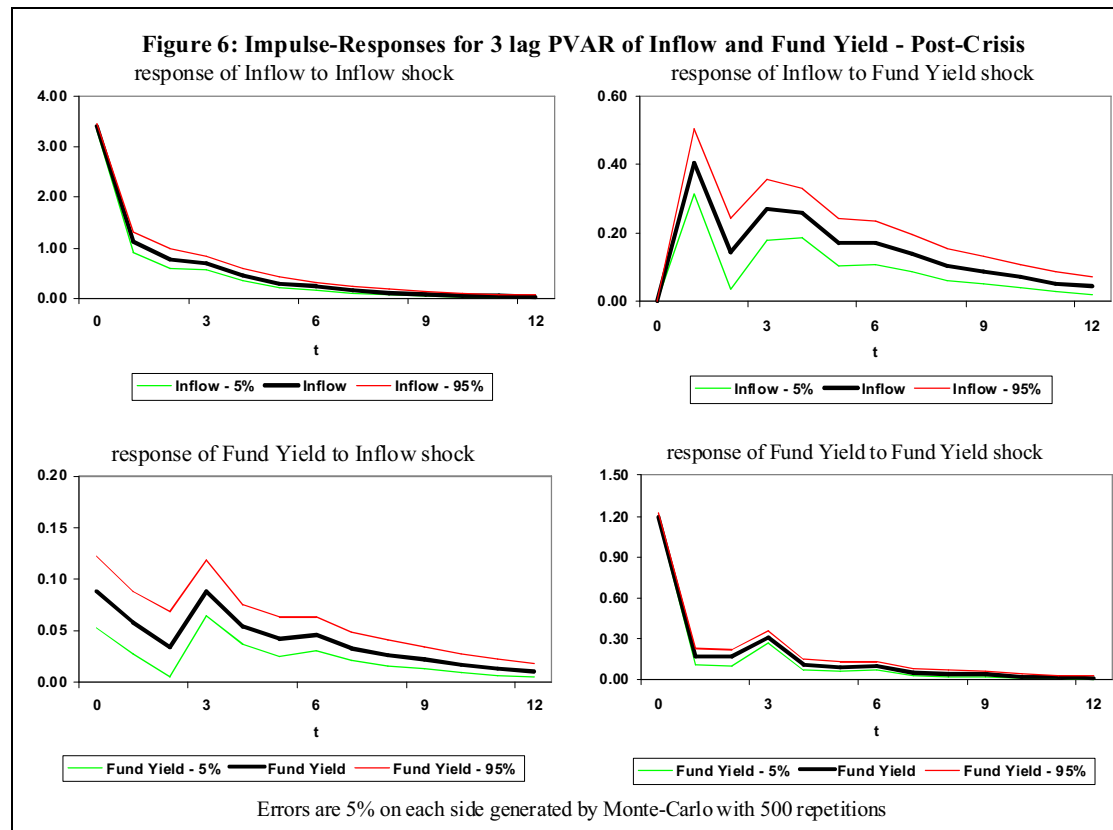
In comparing the dynamic relationships between the variables for the entire period and the pre-crisis period (see figure 4), the primary differences are the weaker response of Fund Yield to Inflow shocks and the disappearance of persistence in Yield, which also partially explains the lack of persistence in the response of Fund Yield to Inflow.



The response of Inflow to Yield shocks is less persistent and less significant during the crisis than in the entire period or before or after the crisis. This may be due to a flight to safety that caused investors to care less about short-run Yield and more about long-term security.



The post-crisis period displays the greatest similarity with the entire period. The relationships between all the variables are positive, significant and persistent.



### 6.3. Effects of Provident Fund Characteristics

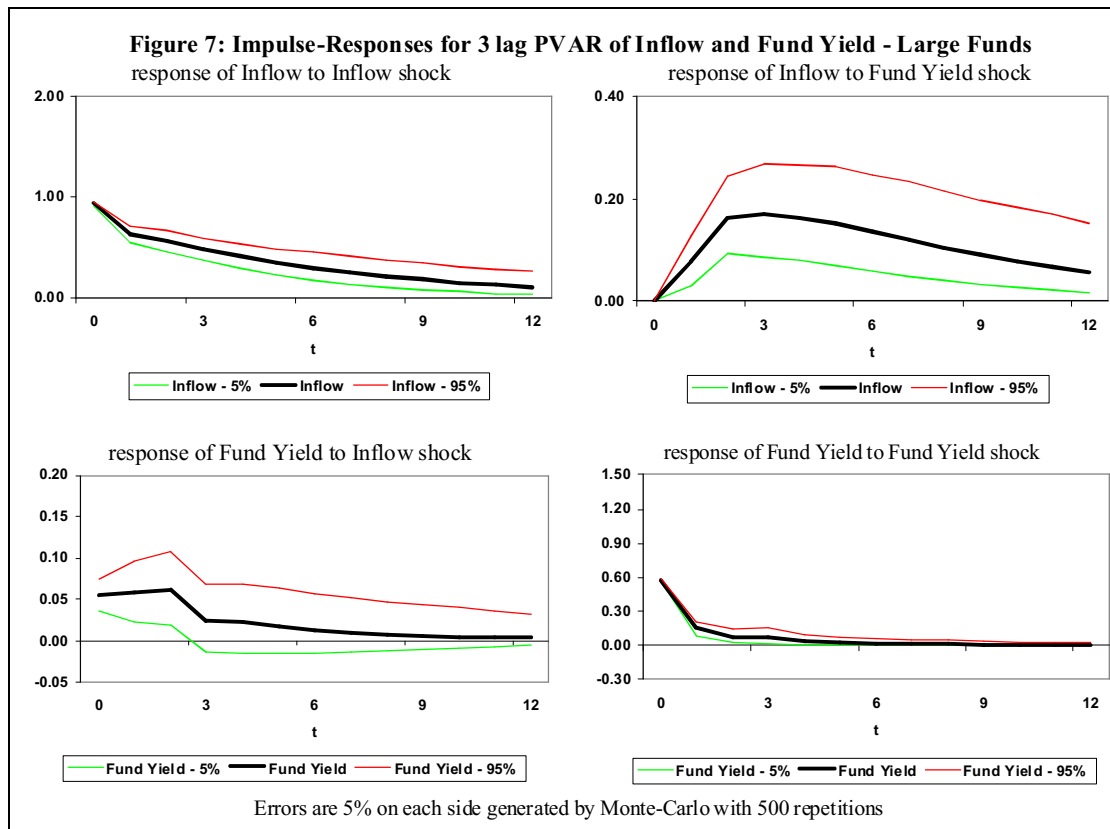
So far we have seen the behavior of investors in provident funds in general and in 3 sub-periods. In order to make sure that these results are not artifacts driven by specific fund characteristics such as fund size, risk or management fees, we sub-divide our sample according to those factors and examine whether this affects our results. We also try to understand whether the results are driven by savers preferences or by other factors, such as employers channeling money to specific funds.

#### 6.3.1 Fund Size

Throughout this paper we normalize yields and inflows by fund assets in order to insure that they are comparable between funds and give equal weight to all funds in the sample. We believe this is necessary to prevent our results being driven entirely by a few large funds. In this section we examine whether the relationships we found above hold for large<sup>16</sup> and small funds alike.

<sup>16</sup> Observing the distribution of fund sizes, we define fund<sub>it</sub> as large if it has 1 Billion NIS or more in assets.

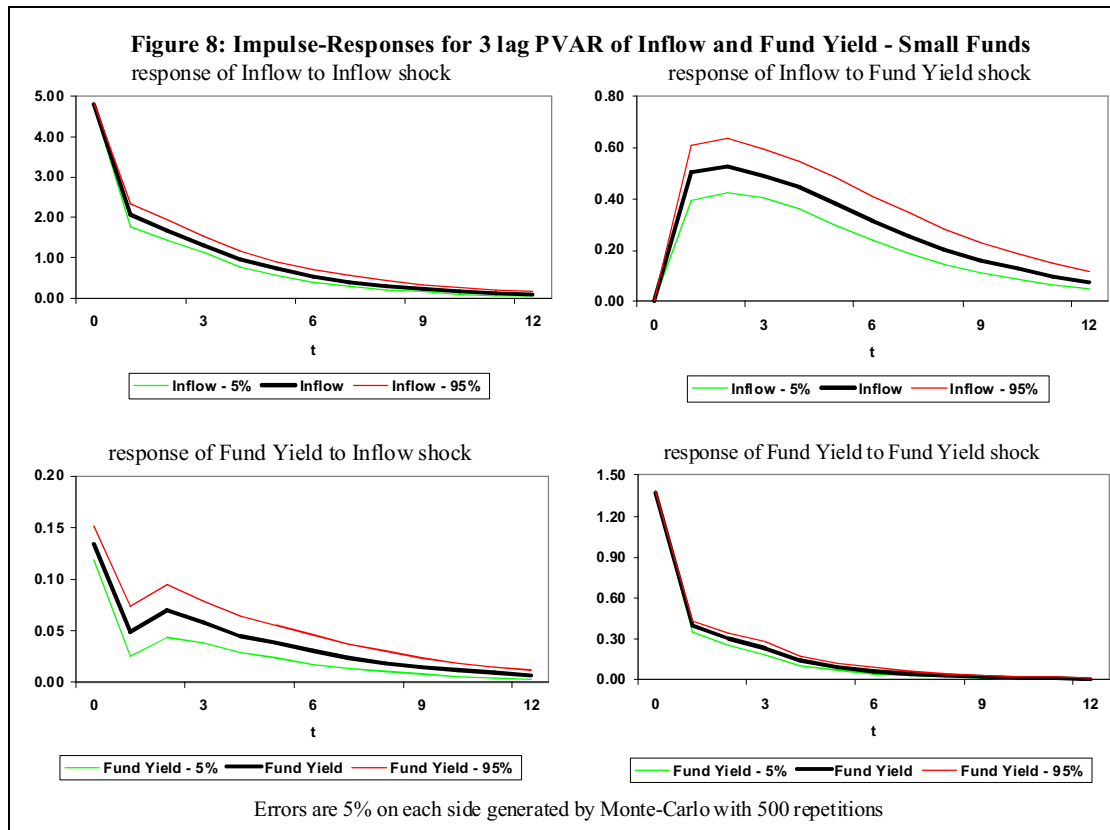
In figure 7 we see the IRFs for the large funds<sup>17</sup>. The results are qualitatively similar to the results in the entire sample, specifically – positive (negative) Yields cause positive (negative) Inflows, and the momentum in Inflows remains. The momentum in Yields is significant but less persistent, while the response of Yield to Inflows is now significant only in the first few months. The sizes of the shocks to Inflow and Yield clarify that large funds have less variance in these variables relative to small funds, but as the average large fund is 17 times the size of the average small fund, the absolute size of those shocks in NIS is much greater in large funds than in small.



In figure 8 we see the IRFs for the small funds. The results are practically identical to the results in the entire sample in both sign and relative size.

<sup>17</sup> We ran the same regression for the large funds while excluding the 3 largest funds, in order to insure that they were not controlling our results. The results were quantitatively and qualitatively similar.





Altogether, we can conclude that our general results hold true for Provident Funds of different sizes, but the response of Yield to Yield and Inflow shocks differs somewhat between sizes.

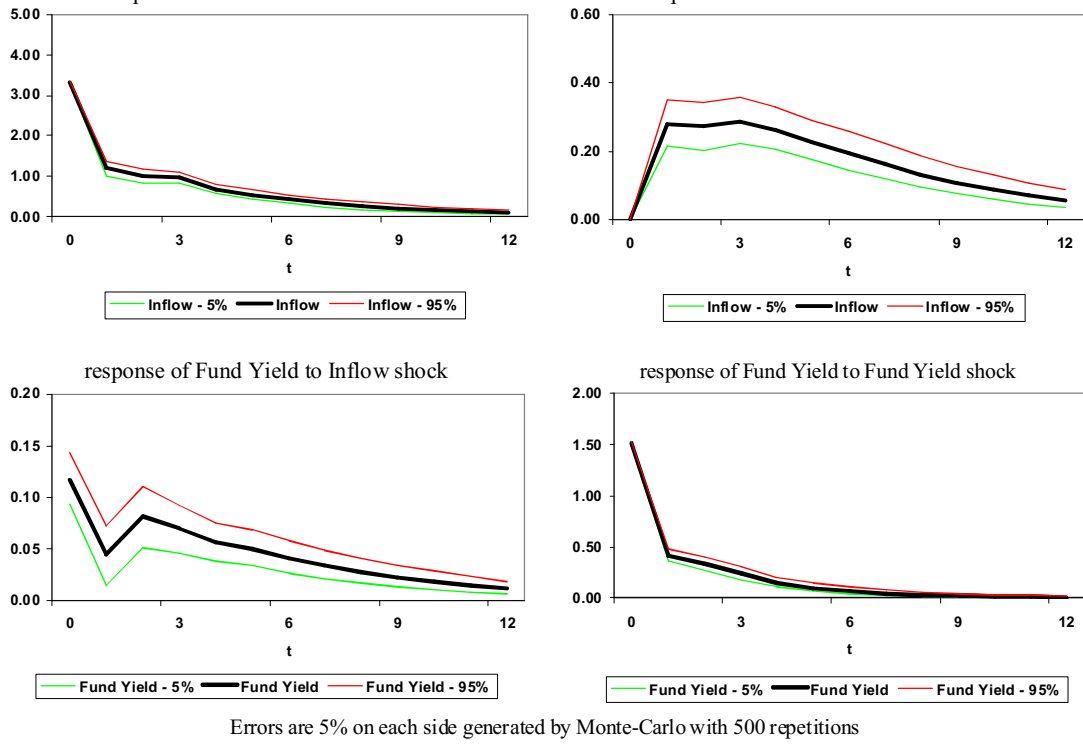
### 6.3.2 Fund Risk

Up to this point we have looked at Fund Yields, while ignoring the risks taken in achieving those yields. In this section we use the *Risky\_Assets* variable as a measure of fund risk, to determine if fund risk affects our results.

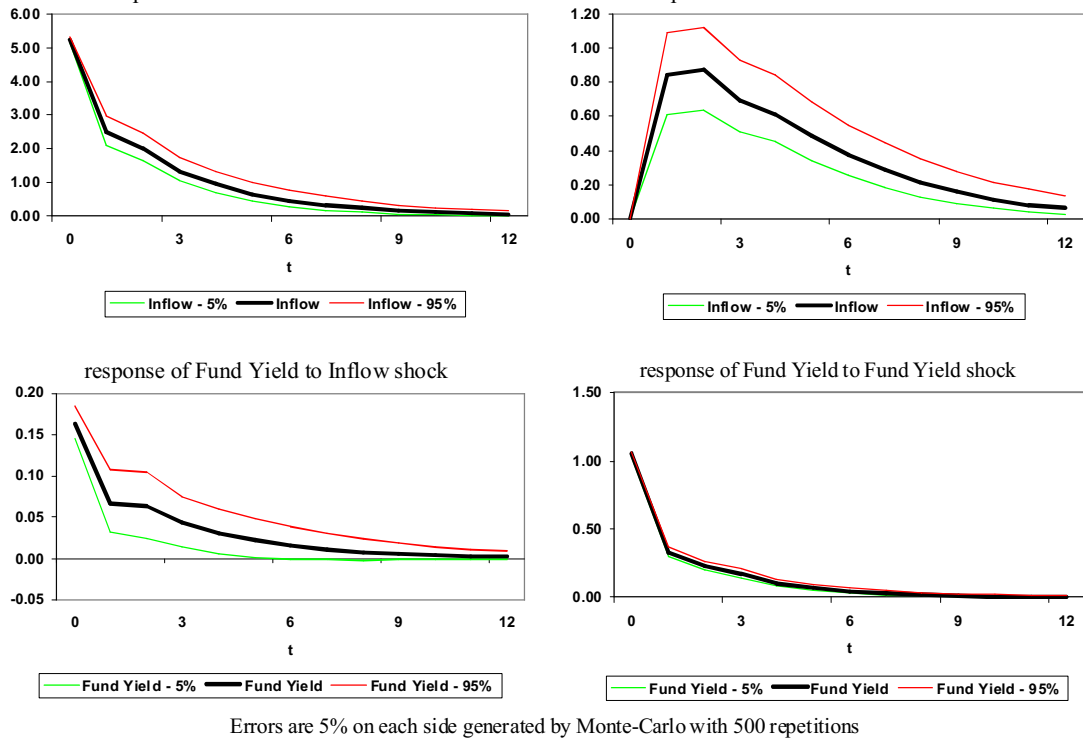
In figures 9-10 we display the IRFs for the high-risk<sup>18</sup> and low-risk funds separately. The results are generally similar in sign but not in magnitude. The main difference lies in the effects of Yield on Inflow: The shock to Yield in the Low-risk funds is smaller but the response of Inflows to Yields is approximately 3 times as large and equally persistent. This tells us that investors are more likely to move to a low risk fund that increases its yield than to a high risk fund that increases its yield, even given that the yield increase is greater in the high-risk fund.

<sup>18</sup> We define a fund as high-risk if the share of its assets which are risky is 50% or above.

**Figure 9: Impulse-Responses for 3 lag PVAR of Inflow and Fund Yield - High Risk Funds**  
 response of Inflow to Inflow shock      response of Inflow to Fund Yield shock



**Figure 10: Impulse-Responses for 3 lag PVAR of Inflow and Fund Yield - Low Risk Funds**  
 response of Inflow to Inflow shock      response of Inflow to Fund Yield shock

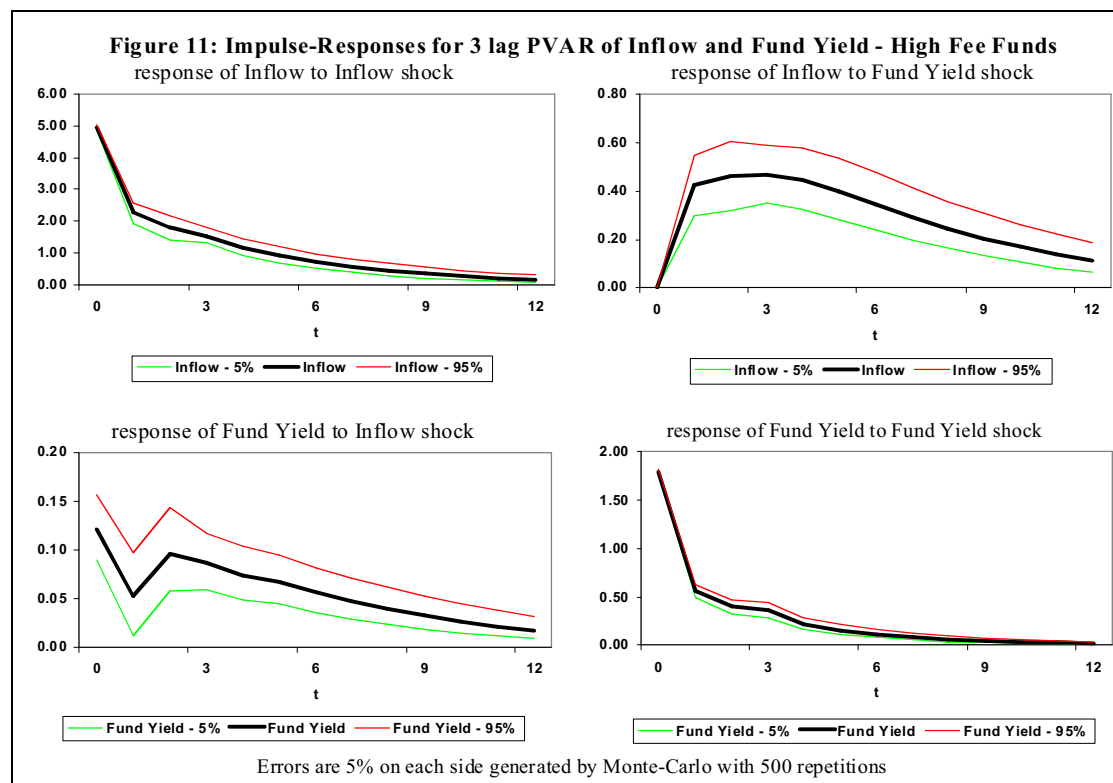


We conclude that while the signs of our general results hold true for Provident Funds of different risk levels, investors respond with different intensities to Yield in funds of different risk levels.

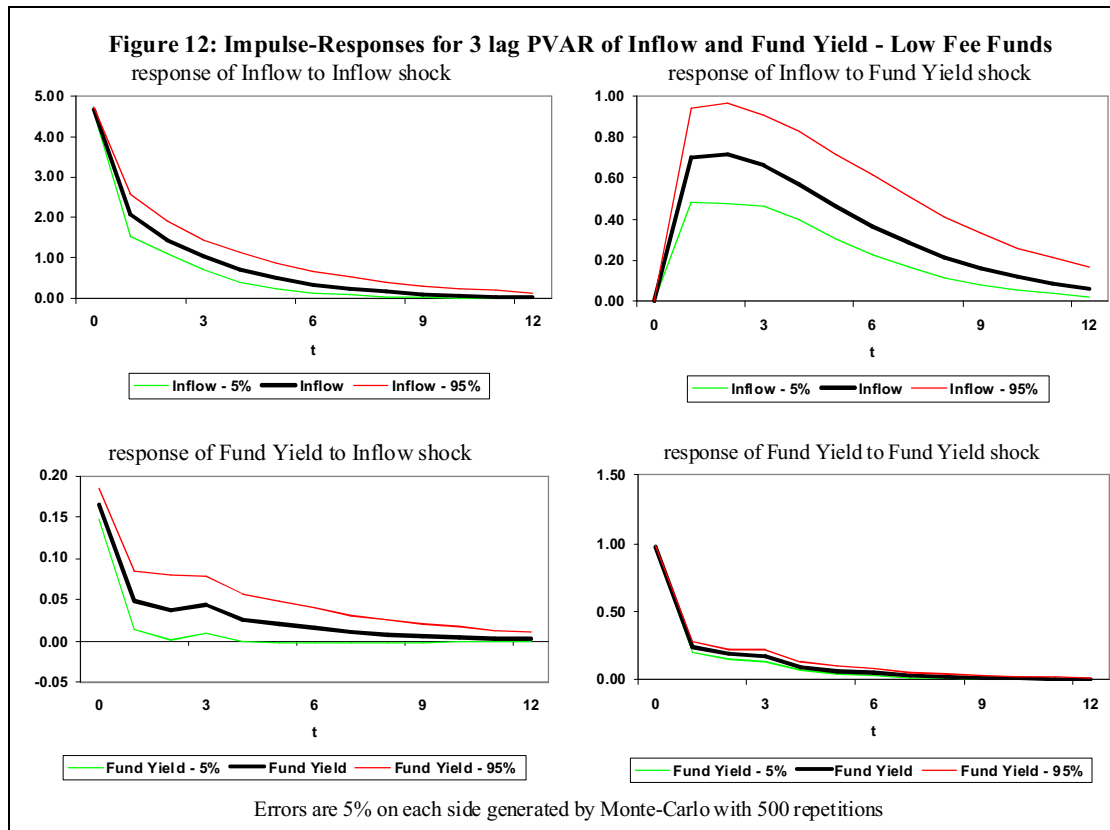
### 6.3.3 Management fees

Another parameter commonly discussed in relation to investor behavior is fund management fees. These fees may have opposite effects on investors – on one hand they cost the investors money and on the other hand they may be used to improve the fund's Yield (e.g. hire skilled money managers).

In figures 11-12 we display the IRFs for the high-fee<sup>19</sup> and low-fee funds separately. The results are generally similar in sign but not in magnitude. The response of Yield to Inflow is less persistent in low-fee funds than in high-fee funds or in the entire sample. The main difference between the two fee-classes lies in the effects of Yield on Inflow: The shock to Yield in the Low-fee funds is half as large but the response of Inflow to Yield is approximately half again as large and equally persistent. This tells us that investors are more likely to move to a low fee fund that increases its yield than to a high fee fund that increases its yield, even given that the yield increase is greater in the high-fee fund.



<sup>19</sup> We define a fund as high-fee if its monthly management fee is greater or equal to 0.08(the sample median).



We conclude that while the signs of our general results hold true for Provident Funds with different levels of management fees, investors respond with different intensities to Yield in funds of different management fee levels<sup>20</sup>.

#### 6.4. Active Entrepreneurs and Passive Employees

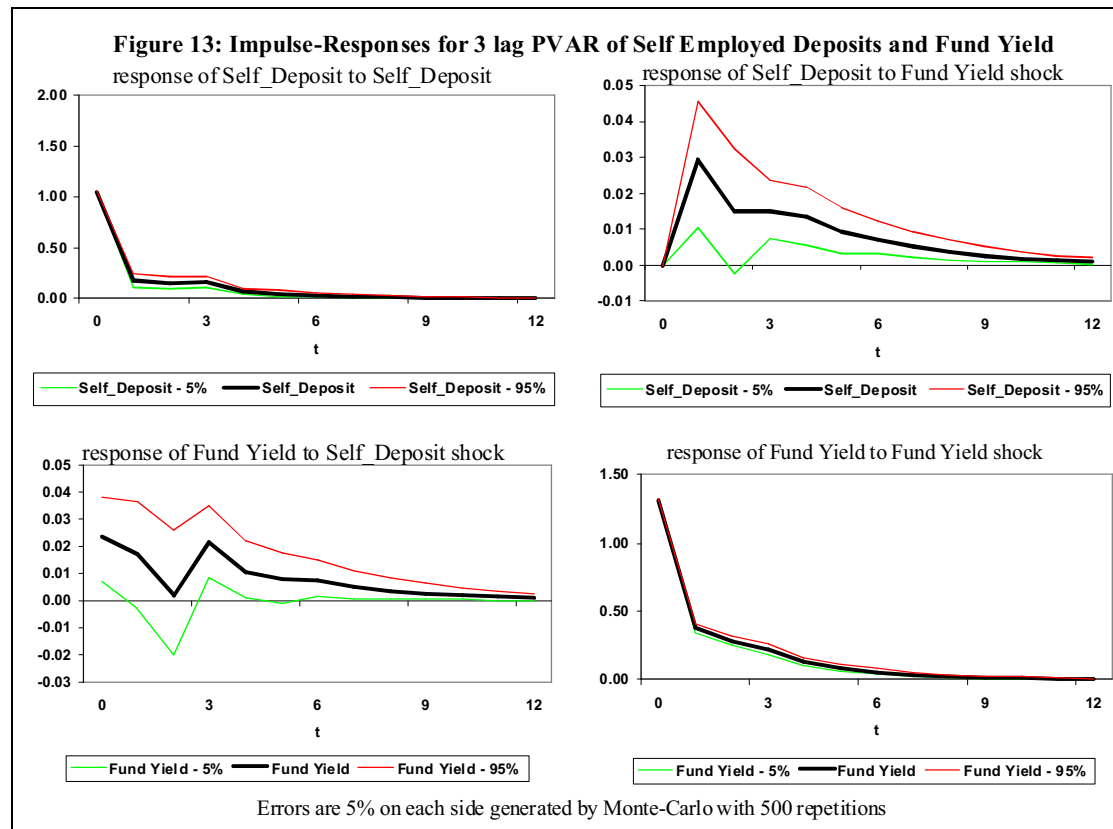
In Israel both self-employed workers and employees use provident funds. The self-employed choose which funds to deposit in, while the employees' choice of fund may be influenced by the employer, the union etc.<sup>21</sup>. Our dataset allows us to distinguish between deposits from the two groups<sup>22</sup>, which enables us to isolate the deposits of the self-employed, a group of savers whom we believe choose provident funds according to their own preferences. An examination of the deposits of the two groups shows that approximately half of the deposits come from each group and this proportion is stable across risk, size and management fee categories, indicating the similarity of the groups in most investment relevant characteristics.

<sup>20</sup> Despite the unavailability of the monthly management fee data to savers, it is possible that this data is a proxy for observable management fee data. We therefore repeat the division of the sample using the monthly data rather than the yearly data, with very similar results.

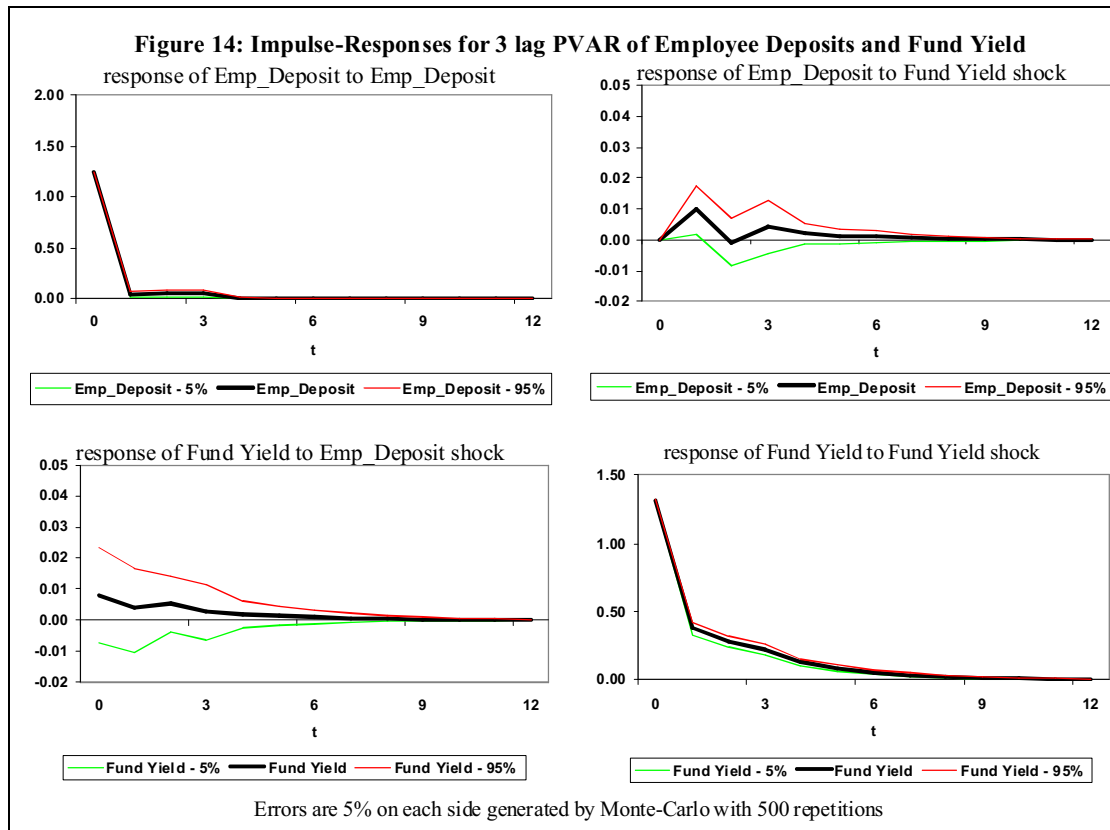
<sup>21</sup> This does not necessarily imply which group is better off, as employees may benefit from lower management fees or better terms in corporate accounts.

<sup>22</sup> Unfortunately we were unable to obtain similar data for withdrawals and transfers.

In Figures 13-14 we display the IRFs for Deposits and Yield for the two employment groups. Looking at the self-employed, the results are qualitatively similar to our main results. In particular we see that Deposits are affected by past Deposits and Yields. The impact of Yield on Deposits, although small relative to Yield's impact on Inflow<sup>23</sup>, can serve as an indicator of the sign of investor response to Yield, ceteris paribus. On the other hand, we see that employee Deposits do not respond to past Deposits or Yields. This lack of response may indicate that employees' choice of provident fund is affected by factors other than fund performance and market trends.



<sup>23</sup>This impact is small relative to fund assets because one may transfer decades of accumulated savings in a single transfer, while a change in the target of monthly deposits will have only a gradual effect on the amount saved in the fund.



### 6.5 Robustness of the results<sup>24</sup>

1. One might suggest that our results are driven by noise in the Inflow variable. In order to tackle this concern we replace the Inflow with the Transfers variable. Unlike Inflow which might be affected by constant deposits and withdrawals which may show high sensitivity to factors unrelated to the funds' attributes, transfers are affected only by the active decisions of savers who decide to move their money into or out of a specific provident fund. When we re-estimate the model using Transfers instead of Inflow the results remain qualitatively and quantitatively similar.
2. When estimating the basic model, we used 3 lags, following the results of various information criteria we examined. As a robustness check we re-estimate the model using both 2 lags and 4 lags. The results are not sensitive in the 2-4 lag range and remain qualitatively and quantitatively similar.
3. Our sample consists of only Allowance and Compensation funds. Though relatively homogenous in their attributes, we do recognize an exception among those funds: there are some Allowance and Compensation provident funds which are open only to employees of a specific firm and not to the general public. One might be concerned that relationship between Inflow and Yield might be different in these funds and thus

<sup>24</sup> Results of the robustness tests other than test #4 are not presented due to space considerations. All such results are available from the authors upon request.

they might bias the entire sample. To eliminate such suspicion, we re-estimate the model after eliminating these funds, which are identifiable using the MOF 'Gemel-Net' data. The results remain qualitatively and quantitatively similar.

4. Finally, as mentioned in section 5.3, prior to the estimations we trimmed the sample in order to avoid extreme Inflow outliers affecting the results. As a robustness check we re-estimate the model, once without the two-sided trimming and once with a 2% trim. The PVAR results (Appendix Figure 1) with a 2% trim are qualitatively and quantitatively similar to the general results. However, the results for the untrimmed sample (Appendix Figure 2) are quite different, particularly the effect of a shock to Inflow on Inflow is very large but only contemporaneous and its effect on Fund Yield is weaker, though still positive and statistically significant. These results suggest that the trimming of the sample according to the Inflow variable had an effect on the results. We believe however, that the trimming is necessary because it prevents the results from being dominated by outliers resulting from fund M&A and fund closures. The comparison between the 1% trimmed, 2% trimmed and untrimmed variables (Appendix Table 1) persuades us that the trimming used disposes of the outliers, is parsimonious in observations and does not significantly influence the other main variables.

The above-mentioned robustness checks support the inference that our results are not driven by data or estimation problems, but rather that they properly describe the relationships between provident funds' yields and Inflows.

## **7. Discussion**

The results of the estimation suggest high autocorrelation in provident fund inflows. The inflow autocorrelation is positive and significant throughout the 3 sub-periods (pre-crisis, crisis, post-crisis). This result is consistent with Del Guercio and Tkac (2002) results for mutual funds, but the opposite of their results for pension funds. This indicates that even after controlling for the financial crisis and fund yields, investors demonstrate herd behavior – investing in provident funds that were popular in recent periods or running from those that were unpopular. Further research into provident fund marketing and distribution channels as well as investment biases may provide better understanding of this behavior.

Provident fund Yields also show high autocorrelation in the general results. However, when we divide the sample into 3 sub-periods, this autocorrelation is persistent only in the post-crisis period, while persistence in the pre-crisis period is very short and during the crisis we are unable to identify persistence in yields at all. This means that during the crisis, past Yields had no predictive power for current and future Yields. The results in the literature regarding persistence of mutual fund performance are mixed, with the persistence in yields

that we find in the general results being in line with some papers regarding mutual funds in the US (e.g. Gruber, 1996) and with Lauterbach and Barak (2002) results for mutual funds in Israel. Blass (2007), using annual data, found no persistence in Israeli provident fund Yields, suggesting that the Yield persistence that we find may be limited to the short-run. This Yield persistence may, however, indicate that investors are able to pick winners, at least in the short-term.

The results show positive effect of short-run Yields on future Inflows. The positive effect of Yield on Inflow suggests that investors tend to chase past yields, and they weigh recent yields more heavily. These findings are consistent with those of Ippolito (1992), Wermers (2003) and Benson, Faff & Smith (2007) regarding mutual funds. This result holds true in all three sub-periods: Investors tend to chase past returns, even during the crisis, though the results are less significant during the crisis sub-period. The weaker response of Inflow to Yield shocks in the crisis sub-period might be explained by a flight to safety that caused investors to care less about short-run Yield and more about long-term security.

Our general results show both contemporaneous and lag positive effect of the fund's inflow on its yield. The contemporaneous response holds in all 3 sub-periods, meaning that positive (negative) Inflows increase (decrease) a fund's Yield in the same period. The response of Yield to Inflow is persistently and significantly positive in all but the crisis sub-period. These results are in line with the permanent information effect hypothesis according to which the Inflows reflect investors' information and the investors correctly predict future short-term yields (Rakowski and Wang, 2009). However, the results do not support the temporary liquidity costs theory (Benson, Faff & Smith, 2007) or theories highlighting the costs of liquidity-motivated trading (e.g. Edelen, 1999; Nanda, Wang and Zheng, 2003).

We see above that the results for the crisis sub-period differ from the other results. Some of these differences are due to the unique characteristics of this period, while others may be due to the fact that the crisis sub-period is only 6 months long and thus the average fund has only 3 observations in this period.

The results confirm that Yield and Inflow have positive, persistent and strongly significant effects on each other, in line with Wermers (2003) results for mutual funds.

We run several robustness checks with results similar in general to the above-mentioned results. The trimming of 1% of the distribution of provident fund flows has a significant impact on the results. We believe, however, that this trimming is required in order to reduce the impact of extreme outliers, made up primarily of fund M&As and closures.

Having established the relationship between Yields and Inflows, we explore the differing effects of provident fund characteristics on this relationship by dividing our sample according to fund size, risk and management fees.



The results for the smaller funds resemble the general results. The response of large funds' Yield and Inflow are significant and positive but weaker than those of small funds, likely due to the fact that the shocks themselves are of much smaller magnitudes.

The divisions of the sample by risk and management fees yield results which are qualitatively similar to the general results, leading to the conclusion that the relationship presented above between Yield and Inflow is not due to risk or management fees. However, the stronger response of Inflow to Yield in Low-Risk Funds and Low-Fee Funds indicates that investors rationally put more weight on returns that are gained with lower costs (whether these costs are incurred directly as fees or indirectly in the form of higher risk).

The ability to distinguish between employee and self-employed deposits enables us to see that the behavior of the self-employed, whose Deposits respond positively to fund Yield and past Deposits, matches our general results. As they are more likely than employees to make independent investment decisions, this serves as further evidence for investor yield chasing and herd behavior. On the other hand, neither Yields nor past Deposits have a significant effect on employees Deposits. While we cannot reject the possibility that the difference between the self-employed and employees is due to differences in unobserved characteristics between the groups, further research into factors that might be relevant to employees only, such as corporate management fee discounts or corporate relationships with provident fund management firms, may prove rewarding.

The results presented in this section support the claim that provident fund investors chase yields. We suspect that this behavior is driven by provident fund advertising and insurance agents, who market provident funds, highlighting short-term yield as opposed to long-term yield. Yield chasing per-se might not necessarily be negative, especially when funds' yields show high autocorrelation, as is the case in our data. This argument is acceptable for short-horizon investors (e.g. mutual fund investors) who can act as momentum investors and chase recent winners for short-term gains. Without research into the relationship between short-term and long-term yield, which is beyond the scope of this paper, it is difficult to reject the possibility of a long-term yield reversal, turning short-term gains into long-term losses. As such, it is harder to justify short-term yield chasing when dealing with pension savings.

## 8. Conclusions

This paper examines a specific segment of the pension savings market: Allowance and Compensation Provident Funds. Provident Funds are a type of fund unique to Israel, similar to pension funds, but with shorter investment horizons, different tax advantages and greater involvement in capital markets.

Using data from the MOF's 'Gemel-net' system and the BOI's 'Klgemel' system, we examine the relationships between provident funds Inflow and Yield while controlling for fund size, risk and management fees. We use a novel econometric method, Panel VAR, in order to tackle endogeneity problems and to make full use of our panel data.

We are able to establish the relationships between Inflow and Yield and to show auto-correlation in both. We find that Yield positively affects future Inflow and interpret this as an indication of investors' yield chasing behavior. We show that investors' tendency to invest in higher yielding funds is greater in funds with lower risk and funds with lower management fees, indicating that investors rationally put more weight on returns that are gained with lower costs. We find that Inflow tends to positively affect Yield both contemporaneously and with a lag. We interpret this result as supportive of the permanent information hypothesis.

Due to the unique nature of the sample period which included a major global financial crisis, we also look into three sub-periods: before, during and after the crisis. The results for the pre- and post-crisis periods are similar to the general results. The crisis sub-period shows a weaker effect of Yield on Inflow, which we interpret as flight to safety taking over from yield chasing.

Our dataset allows us to isolate the deposits of the self-employed, a group of savers whom we believe choose provident funds according to their own preferences, from the deposits of the employees, who may be affected by exogenous factors. The results support our main conclusions regarding investor behavior. However, further research regarding the factors affecting employees' choice of provident fund is called for.

This paper establishes the bi-directional connection between provident fund Yields and Inflows and shows empirically that provident fund investors chase yields. It is unique methodologically for its use of the Panel-VAR estimation method to investigate the relationships between Inflows and Yields in the field of investments. Further research on the connection between current short-term yields and future long-term yields might provide insights on the efficacy of the investor behavior outlined in this paper.

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## Appendix

<b>Appendix table 1: Main Variables by Inflow Trim (Monthly Data)</b>						
	<b>Sample with 2% Trim</b>					
	<b>mean</b>	<b>median</b>	<b>sd</b>	<b>min</b>	<b>max</b>	<b>N</b>
Inflows	0.84%	-0.06%	5.42%	-16.25%	64.08%	21,394
Transfers	0.82%	-0.02%	5.10%	-16.28%	65.59%	21,394
Fund Yield	0.60%	0.77%	2.31%	-22.22%	19.35%	21,394
Fund Assets	561,226	133,810	1,690,280	-	21,700,000	21,394
Risky Assets	51%	53%	24%	1%	100%	21,370
Management Fee	0.07%	0.07%	0.05%	0.00%	0.34%	19,304
	<b>Selected Sample - Sample with 1% Trim</b>					
	<b>mean</b>	<b>median</b>	<b>sd</b>	<b>min</b>	<b>max</b>	<b>N</b>
Inflows	1.01%	-0.06%	6.83%	-27.25%	139.15%	21,594
Transfers	0.97%	-0.01%	6.36%	-30.96%	125.64%	21,594
Fund Yield	0.60%	0.76%	2.30%	-22.22%	19.35%	21,594
Fund Assets	556,526	132,005	1,683,187	-	21,700,000	21,594
Risky Assets	51%	53%	24%	1%	100%	21,570
Management Fee	0.07%	0.07%	0.05%	0.00%	0.34%	19,498
	<b>Untrimmed Sample</b>					
	<b>mean</b>	<b>median</b>	<b>sd</b>	<b>min</b>	<b>max</b>	<b>N</b>
Inflows	1.45%	-0.05%	31.24%	-100.83%	4232.14%	21,808
Transfers	1.38%	-0.01%	31.00%	-100.00%	4228.57%	21,808
Fund Yield	0.61%	0.76%	2.33%	-22.22%	19.35%	21,808
Fund Assets	551,231	129,810	1,675,756	-	21,700,000	21,808
Risky Assets	51%	53%	24%	1%	100%	21,779
Management Fee	0.07%	0.07%	0.05%	0.00%	0.34%	19,707

<b>Appendix Table 2: General PVAR Results*</b>		
	<b>Entire Period</b>	
	<b>Response of:</b>	
<b>Response to:</b>	<b>Inflow</b>	<b>Fund Yield</b>
<b><u>Inflow Variable</u></b>		
Inflow in t-1	0.424*** [12.503]	0.02 [0.733]
Inflow in t-2	0.155*** [5.631]	0.006** [2.102]
Inflow in t-3	0.045** [2.466]	0.000 [0.208]
<b><u>Yield Variables</u></b>		
Fund Yield in t-1	0.359*** [7.935]	0.286*** [16.248]
Fund Yield in t-2	0.124*** [3.276]	0.131*** [8.057]
Fund Yield in t-3	0.017 [0.530]	0.064*** [3.791]
Number of Observations		20071
Number of Funds		364

\* t-statistics are in the parantheses. Time and fund fixed effects are removed prior to estimation. \*,\*\* and \*\*\* indicate statistical significance at the 10,5 and 1 percent level, respectively.

