

Do the Israeli Provident Funds have the Ability to Time the Bond and Stock Markets? An Analysis across Alternative Investments

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Abstract

This paper investigates whether Israeli fund managers possess market-timing ability across asset classes over time, using 15 years of monthly data from the Israeli provident funds. We apply three methodologies based on return based and portfolio holdings approaches. Most of the early return-based timing methods and the most recent portfolio holdings measures suggest that U.S. mutual fund managers do not possess equity timing ability. Our study is the first to test this evidence on multi-asset class provident funds in the Israeli market and compare the timing ability of fund managers in each asset class according to different approaches. We introduce an alternative holdings method that combine the asset allocation theory with that of market timing and use "excess policy" holdings data to predict future market returns. In addition, previous studies mostly ignore the contribution of other instruments to timing decisions, which may cause any conclusions about managers' timing decisions to be incomplete. Hence, we test equity market timing with respect to all markets using a multiple market index model in the holdings approach. In line with previous research, our empirical results indicate significantly negative market timing in domestic equities according to all the measures used. On the other hand, provident fund managers on average seem to display some timing ability for government bonds.

Keywords: Israeli provident funds, Market timing, Multi asset class, Portfolio holdings, Returns

1. Introduction

A very important question for the modern investor and academic literature has been whether fund managers can systematically beat the market that allow them to earn back a significant fraction of the fees and expenses that they generate. Lee and Rahman (1999) classify fund managers' skills into two components: 1) forecast of price movements of individual stocks (security selection) and 2) forecast of price movements of the general stock market as a whole (market timing). In this paper, we focus on the market timing skills of provident fund managers using a unique database from the Israeli market.

Provident funds, which are one of the five major types of pension channels in Israel, are relatively less popular investments compared to other pension funds and mutual funds for various reasons. First, unlike other pension funds, provident funds do not include any insurance coverage for death and disability. Second, new (and old) pension funds have a relative financial advantage over the provident funds as they can invest in the non-tradable earmarked government bonds. These bonds are a government subsidy, which have relatively high and stable rates of return and comprise 30% of pension fund holdings. Moreover, as of 2005, the advantage allowing provident fund members to withdraw their funds as a lump sum after 15 years in the fund was abolished and since then, funds may be withdrawn only at retirement. Since 2009, members also have the option to transfer their savings to different savings vehicles (provident, insurance, pension) and not only among similar ones. Finally, the Bachar Reform of 2005 forced banks to sell their provident funds and mutual funds to avoid concentration of power and conflicts of interest, which liberalized the market. Therefore, market-timing and other strategies could be vital for provident funds to increase their returns and improve their competition with other saving vehicles.

Our research is the first to examine whether actively managed provident funds in Israel possess market-timing ability across multi asset classes using three methodologies. In addition to testing market timing through the conventional return based methods, we introduce a holdings based method, which tests market timing in the context of provident

funds' asset class policies. This is because the investment preference of a fund's board of directors could pose a constraint on day-to-day actions of its managers. Therefore, we checked the relationship between each fund's monthly "excess policy" asset class weights and the next month asset class market returns to measure managers' timing ability in each investment category. Furthermore, the decision to invest in any asset class should not depend only on the future performance of its related market but also on the expected performance of other markets due to the correlation between them. In this new approach, we considered that the bond and security markets, domestic and international capital markets are all interrelated and checked how together they affect the market timing decisions. To illustrate, we examined market timing in the equity asset class, with respect to the future performance of bonds, equities and other international indices.

2. Literature Review

Early studies concentrated on the overall performance of funds and compared a particular manager's performance with that of a benchmark index fund. (Sharpe, 1964; Treynor, 1965; Jensen, 1968; Mc Donald, 1974; Eun, Kolodny, & Resnick, 1991). However, these approaches failed to separate the performance attributed to funds' strategic investment policies and the ability of the managers in terms of security selection and market timing.

The literature suggests different ways of addressing the market timing issue. Initially, Treynor and Mazuhy (1966, TM) and later Henriksson and Merton (1981, HM) proposed two different return-based measures in the context of the capital asset pricing model. Both models assume a linear relationship between portfolio and market returns, which becomes higher (or lower) in market ups (or downs). These models provided limited or no evidence of market-timing ability for mutual fund managers in the U.S. (Kon, 1983; Henriksson, 1984; Jagannathan & Korajczyk, 1986; Cumby & Glen, 1990; Chen, Lee, Rahman, & Chan, 1993; Coggin, Fabozzi, & Rahman, 1993; Lee & Rahman, 1999). They also received some criticism of not providing a complete picture. Fama and French (1993) argued that additional factors –firm size (SMB) and book to market ratio (HML)- should be added to the CAPM and Canhart (1997) suggested the momentum (MOM) as a fourth factor. Bollen and Busse (2001) pointed out that previous studies were weak due to using statistical tests based on monthly data. Instead, they used daily data and were able to prove market timing ability for a large number of funds in their sample. There has been limited research specifically on the timing ability of multi asset-class fund managers. Comer (2006) considered a TM model of two-market timing factors for multi asset-class funds, including stock and bond benchmarks. Using a sample of 58 funds in the period between 1992 and 2000, he found timing ability in 26% of the funds. Andonov, Bauer, & Cremers (2012) claimed that pension funds are able to achieve excess returns from market timing activities. However, they carefully stated that this excess return is not attributable to conscious tactical allocation but due to a rebalancing rule that allow some deviation from policy weights.

Jiang, Yao, & Yu (2007, JYY), Kaplan and Sensoy (2008) Elton, Gruber, & Blake (2012, EGB) suggested the holdings-based measures, based on funds' actual asset compositions, as a better way to estimate the fund sensitivity to the market and to measure timing ability. In this model, portfolio beta, which is a function of a fund's observed portfolio holdings at the beginning of a holding period multiplied with their corresponding betas, replaces the portfolio return to test market timing. Employing "before period" betas instead of "period fund returns" to investigate if managers correctly forecast relevant market movements avoids the bias from subsequent trading activity. Jiang et al. (2007) and Kaplan et al. (2008) found positive and significant timing ability in the US domestic equity funds, using quarterly data of changing betas based on a single index model. However, recent research by Elton et al. (2012) yielded the opposite conclusion based on a more sophisticated multi-index model (Fama-French factors (1993) and a bond index) using a full set of holdings data at monthly frequency. Moreover, Elton et al. (2012) investigated timing ability across different industries and found that negative timing stems mainly from allocations to high tech stocks. Matallin-Saez (2014) argued that the holdings-based method might also be the subject of timing bias. He claimed that the beta used at the beginning of an analysis period might not be representative of that period, due to possible interim trading within that time-frame, obscuring the market timing results.

Brinson, Hood, & Beebower (1986, 1991) proposed a framework for calculating the returns attributable to market timing and security selection separately, after excluding the returns attributable to asset allocation policy. They concluded that investment policy is the primary determinant of total return variation for large U.S. funds, and that the contributions from market timing and security selection play minor roles. On the other hand, Xiong, Ibbotson, Idzorek, & Chen (2010) found an almost equal explanatory power of active management and asset allocation policy for U.S. balanced, equity, and international equity funds. Aglietta, Bri ère, Rigot, & Signori (2012) also reported evidence of a significant contribution from active management for pension funds. They were also able to show and compare the effect of active management over various asset classes since they held rare data on individual asset class returns.

However, these research do not deal with the components of active management; namely, market timing and security selection. In Israel, recent research by Arbaa and Benzion (2016) studied, separately, the contribution of market timing and security selection to Israeli provident funds' total returns and "excess market" returns. They found that fund performance from active management owes mainly to security selection and the overall timing ability is negligible. However, no study in Israel made a deeper analysis to see whether timing ability exists in different investment categories.

Clare, Sherman, & Thomas (2016) used return based and holding based approaches to search evidence of market timing in different asset classes of the US, UK and Canadian mutual funds. In their research, they took an alternative holdings-based approach using the percentage changes in asset class weights rather than betas to measure timing ability. Regardless of the method, country or the asset class of analysis, they found that only a small minority of funds show market timing ability.

In short, there is no consensus in the vast array of literature as to which market timing measure yield more sound and accurate results. Research findings highlight the limitations and drawbacks for both return-based and holding-based measures and results differ under different circumstances and assumptions. Moreover, most of the research findings involve funds of a single asset class: equity funds.

In this research, we tested the evidence of market timing, across different investment categories, for the Israeli Provident Funds. Israeli Provident Funds provide a good basis for such analysis since they do not have a specific asset class preference. We used the traditional returns-based methods and an alternative holdings-based approach that takes into account the effect of asset allocation policy on investment decisions. According to the asset allocation theory, market timing depends on the manager's ability to actively manage and change the asset class weights above or below that of policy. Therefore, market-timing weights are "excess policy" weights that represent the monthly net allocations to each investment category after deducting the fund's strategic asset allocation targets. In this respect, our method assumes a linear relationship between each fund's "excess policy" asset class weights and the next month asset class market returns. The rest of this paper is organized as follows: Section 3 describes the data and the statistical models, Section 4 presents and discusses the results and Section 5 concludes our findings.

3. Methodology

3.1 Sample

Our data contains 101 provident funds from Israel and covers the period between January 2000 and December 2014. We excluded those funds that lack return data and/or have insignificant asset size (below 100million shekels), which constitute only 0.5% of the sample. Our sample, which amounted to a total asset size of 209billion shekels as of December 2014, represents 57% of all the provident funds.

We received the dataset for the identified sample from two databases, which provide market data on Israeli provident funds: GEMELNET and the Israeli Ministry of Finance's (MOF). The data includes the fund name and identification number, net assets and monthly returns, annual management fees and most important, each fund's monthly asset allocation weights across nine investment categories. We define the funds in our sample as balanced funds, since more than 90% of the funds in the sample do not have a specific investment policy or risk preference. We obtained 18180 observations per month and 180 observations per fund. We took out the poorly performing, liquidated funds or funds that merged into other funds. Therefore, our sample is subject to survivorship bias.

Table 1 summarizes the statistics of fund exposures to each asset class used in the holdings based method and lists the benchmark indices, which represent the market returns for each asset class. To simplify our study, we reduced the number of investment categories available from nine to five- cash and cash equivalents, government bonds, corporate bonds, equities and a miscellaneous category "others". "Others" cover various investments such as loans, participation certificates in mutual funds, mortgages, land rights, futures assets and ETFs, for which setting an appropriate market index is difficult. Therefore, in accordance with Brinson et al. (1986), we eliminate the "others" investment weight each month, from each fund and calculate new weights for the remaining asset classes. Consequently, we spread the weight of "others" proportionally to other categories. In addition, the benchmark indices for the sample include both Israeli and international indices, in order to account for international investments.

Table 1. Monthly summary statistics of 101 Israeli provident funds, 2000-2014

Asset Weights	Average	Min	Max	Standard	Benchmark Returns
				Deviation	
Cash& deposits	14.91%	-2.95%	99.71%	10.56%	Israeli gov bond index > 1yr and Citi World government bond index Israeli index of all corporate bonds TA 100 and MSCI World stock index Not available
Government bonds	35.95%	0.00%	99.44%	15.52%	
Corporate bonds	26.95%	0.00%	96.69%	12.60%	
Stocks	17.83%	-0.20%	96.54%	12.16%	
Other	4.36%	-4.60%	31.02%	5.35%	
Total	<u>100.00%</u>				
Cash& deposits	15.44%	-2.95%	99.91%	10.71%	
Government bonds	37.35%	0.00%	99.49%	15.43%	
Corporate bonds	28.35%	0.00%	97.29%	13.33%	
Stocks	18.86%	-0.20%	97.84%	12.95%	
Total	<u>100.00%</u>				

We do not have access to provident funds' domestic and foreign asset compositions in each asset class. However, we observe that on aggregate, average international investments of Israeli provident funds grew from 1.2% in 2000 to 19.8% of the total assets in 2014. Therefore, we used two foreign benchmarks in the return- based and holdings-based analyses, to account for investments in foreign government bonds and equities.

We obtained the monthly benchmark returns, in Table 1, of local assets from the Israeli Stock Exchange and those of foreign government bonds and foreign equities from Citibank and MSCI, respectively. Regarding Israeli government bonds, we used a local government bond index with maturities greater than one year. The Israeli corporate bond index comprises a general index, which include all the corporate bonds trading on the Israeli exchange. For equities, we used the TA-100 Index, which consists of 100 companies with the largest market capitalization in the Tel Aviv Stock Exchange (TASE). We used the short-term Treasury bill index for Israel known as Makam as the risk free rate to be applied to domestic benchmarks and monthly three month US Treasury bill rates as the risk free rate to be applied to foreign benchmarks. Given that the selected international indices (Citi World Government Bond and MSCI World Stock indices) and their accompanying risk free rates are in US dollars, we converted the foreign indices and risk free rates to shekels using the monthly exchange rates between 2000 and 2014.

3.2 Statistical Model

We used three methodologies to investigate whether multi asset class provident funds in Israel can time the market. The first two are returns-based methods, applying the quadratic regression of Treynor and Mazuhy (1966, TM) and the "dual beta" approach of Henriksson and Merton (1981, HM) to monthly fund returns. The third is a holdings based method similar to that of Clare et al. (2016) using the monthly multi asset class weights (holdings) of provident funds but in excess of preset long term policy weights.

3.2.1 Returns based methods

1) *TM approach:* We extended the single asset class TM model to multi asset classes using the following formula:

$$R_{i,t} = \alpha_i + \beta_1 R_{g,t} + \beta_2 R_{c,t} + \beta_3 R_{e,t} + \beta_4 R_{f,t} + \beta_5 R_{fg,t} + \beta_6 R_{fe,t} + \beta_7 R_{fge,t} + \beta_8 R_{fefe,t} + \beta_9 R_{fegf,t} + \beta_{10} R_{feff,t} + \beta_{11} R_{fgef,t} + \beta_{12} R_{fefef,t} + \beta_{13} R_{fegfe,t} + \beta_{14} R_{fefef,t} + \beta_{15} R_{fegfe,t} + \beta_{16} R_{fefef,t} + \beta_{17} R_{fegfe,t} + \beta_{18} R_{fefef,t} + \beta_{19} R_{fegfe,t} + \beta_{20} R_{fefef,t} + e_{i,t} \tag{1}$$

where α is the intercept, $R_{i,t}$ is the excess return on fund i at time t , R_g is the excess return on the general index for domestic government bonds, R_c is the excess return on the index for domestic corporate bonds, R_e is the excess return on the index for domestic equities, R_{fe} is the excess return on the international index of equities, R_{fg} is the excess return on the international government bond index and e is the error term. The square term in the model captures the convex relationship between fund returns and asset class benchmark returns and γ is a parameter that depends on the convexity of the portfolio return function. According to the model, if a fund manager can anticipate the rise (fall) in a specific market in the near future and increases (reduces) his portfolio's exposure in the corresponding asset class before the increase (decrease), the γ value will be positive. Positive and statistically significant γ values may be interpreted as evidence of timing ability for the associated asset classes. On the other hand, if managers increases (reduces) their exposures to a market before it falls (rises) the γ value will be negative, which implies negative market timing.

2) *HM approach*: We employ the following model for multi asset classes using the original HM market-timing measure:

$$R_{i,t} = \alpha_i + \beta_1 I_{i,t}(R_{g,t}) + \gamma_1 I_i(R_{g,t}) + \beta_2 I_{i,t}(R_{c,t}) + \gamma_2 I_i(R_{c,t}) + \beta_3 I_{i,t}(R_{s,t}) + \gamma_3 I_i(R_{e,t}) + \beta_4 I_{i,t}(R_{fe,t}) + \gamma_4 I_i(R_{fe,t}) + \beta_5 I_{i,t}(R_{fg,t}) + \gamma_5 I_i(R_{fg,t}) + e_{i,t} \quad (2)$$

where I is an indicator value that equals 1 if the benchmark asset class returns in excess of the risk free rate are positive and otherwise zero. All other parameters are the same as in the TM approach. In this model, the fund has two target betas for each asset class that define the maximum and minimum limits in market ups and downs. Hence, managers switch between the maximum and minimum betas in anticipation of bull and bear markets. The γ coefficient captures the difference between these two betas, whereas a positive γ value indicates market timing ability for active managers.

3.2.2 Holdings based method

The third method is a holdings based timing measure, similar to that of Clare et al. (2016). Clare et al. (2016) performed a relatively simple technique of regressing the monthly percentage changes in asset class weights at time t of US, UK and Canadian mutual funds against the monthly returns at time $t+1$ on those asset classes (Note 1). We extended their approach by taking into account the asset allocation policies of provident funds and we stripped asset class weights from that of policy. This method enables us to see the manager's ability to actively over or underweight asset classes relative to the fund policy and his success to time those bets. For this purpose, we looked into the relation between monthly proportions invested in broad asset classes, in excess of target weights (policy), and the corresponding market returns of the following month. This linear relation is expressed as follows (Note 2):

$$(W_{tj,i,t} - W_{pj,i,t}) = \alpha_i + \gamma(R_{j,t+1}) + e_{i,t} \quad (3)$$

where $W_{tj,i,t}$ is the percentage weight of fund i in asset class J at time t , $W_{pj,i,t}$ is the policy weight of fund i in asset class J at time t , $R_{j,t+1}$ is the excess market (benchmark) return on asset class J at time $t+1$, α is the intercept and e is the error term. The γ coefficient shows the degree to which a manager can time the asset class J . The objective of this model is to determine whether managers change their asset class weights correctly relative to their long-run strategic target weights in anticipation of a positive or negative return in the associated markets. A positive value for γ implies that the manager can successfully anticipate market trends, whereas a negative value indicates vice versa. We made three regressions for three asset classes for which we possess monthly individual weights of each fund: government bonds, corporate bonds and equities. Moreover, a fund manager's investment decisions in any market category probably depend on the performance of that market relative to other markets. Therefore, we applied the following extension to our holdings based formula to see equity market timing relative to all available investments, including foreign equities and bonds²:

$$(W_{te,i,t} - W_{pe,i,t}) = \alpha_i + \gamma_1(R_{g,t+1}) + \gamma_2(R_{c,t+1}) + \gamma_3(R_{e,t+1}) + \gamma_4(R_{fe,t+1}) + \gamma_5(R_{fg,t+1}) + e_{i,t} \quad (4)$$

where $W_{te,i,t}$ is the percentage weight of fund i in domestic equities at time t , $W_{pe,i,t}$ is the policy weight of fund i in domestic equities at time t , $R_{e,t+1}$ is the excess return on the general index for domestic equities at time $t+1$, R_g is the excess return on the index for domestic government bonds, R_c is the excess return on the index for corporate bonds, R_{fe} is the excess return on the international index of equities and R_{fg} is the excess return on the international government bond index.

Regarding policy weights, we used the measure of Blake, Lehmann, & Timmermann (1999) and we constructed the policy weights by linearly interpolating the initial and terminal portfolio weights from Jan 2000 (time: I) to 2014 (time: T). We defined the benchmark weight for fund i in asset class j at time t in the below formula:

$$W_{pj,i,t} = W_{j,i,I} + (t \div T) \times (W_{j,i,T} - W_{j,i,I}) \quad (5)$$

We used a dynamic approach since static allocation assumes long-term return expectations will not change, regardless of capital market or macro-economic conditions. Although the resulting policy weights suffer from a look-ahead bias, they have the appealing property of accounting for nonstationarity in portfolio weights.

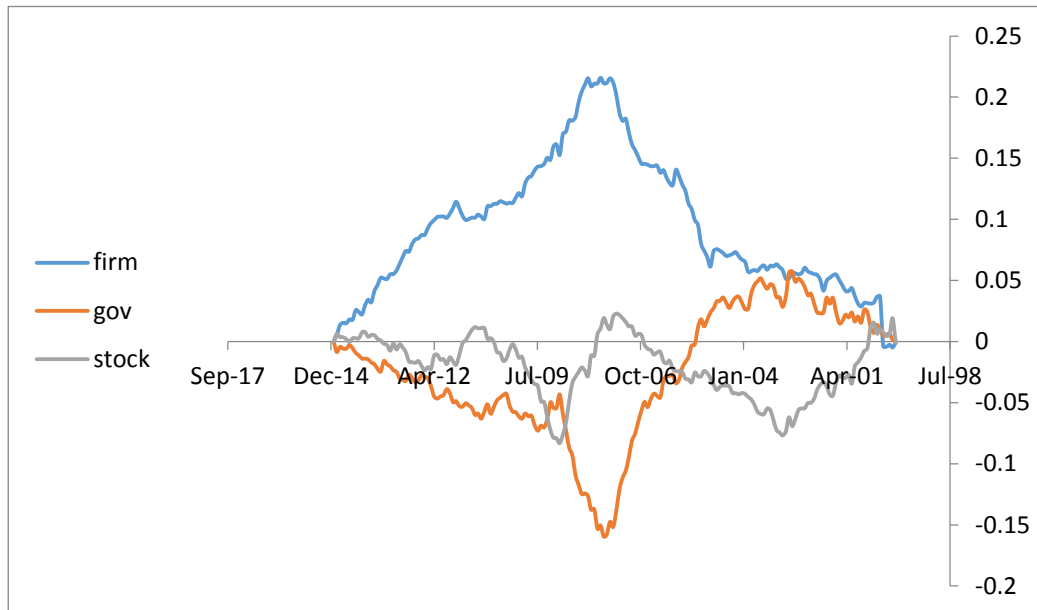


Figure 1. Cross sectional timing decisions (excess policy weights): holdings based method

Figure 1 is the plot of the 15 year cross sectional (across funds) average market timing weights (excess policy) in percentages with respect to three asset classes: government bonds, corporate bonds and equities. This plot visually shows the Israeli Provident funds' equity and bond market timing decisions above or below their preset policies and the relationship between these decisions. In general provident funds appear to be bullish on corporate bonds during our whole period of analysis. Moreover, they seem to be relatively more conservative with regards to their equity timing decisions and do not deviate much from their long term policies. This observation is logical as they have no success to foresee equity market trends, as we will later show in the results section.

Until the middle of 2005, timing decisions in government and corporate bonds appear to go hand in hand and opposite to equity timing decisions. Thereafter provident funds seem to reduce their government bond holdings below policy benchmarks at the benefit of corporate bonds and partly equities. This is due to the Bachar reform of 2005, which forced banks to sell their provident and mutual funds in order to liberalize the market and increase competition. After the Bachar Reform, private entities and insurance firms took over the ownership and management of provident funds, and the number of provident funds multiplied. The increasing competition and change in the control structure encouraged provident fund companies to take greater risks to attract new capital.

4. Results

4.1 Returns Based Methods

The two return based methods we used in this research yield similar results, consistent with each other. Table 2 presents the estimation results of TM and HM approaches in Panel A and B, respectively, at the aggregate level. We used the panel regression method to account for the fact that observations from the same fund are not independent relative to one another in this time-series cross-sectional (panel) data set. According to both models, equity market-timing coefficient is significantly negative at the 1% level, suggesting that fund managers do not succeed in predicting short-term market movements in equities. On the other hand, TM and HM measures imply positive market timing in all of the other asset classes at 1% and/or 5% significance levels. Among all, the strongest sign of successful market timing appears in government bonds, with 1% significance according to both measures.

Table 2. Random regression results in multiple asset classes: returns based methods

	PANEL A: Multi asset TM Model			PANEL B: Multi asset HM Model		
	Timing coefficient	Standard dev.	Significance	Timing coefficient	Standard dev.	Significance
α	0.0009	0.00	***	0.0010	0.00	***
Gov. bond	2.8124	0.43	***	0.1112	0.02	***
Firm bond	0.2301	0.10	**	0.0380	0.01	***
Equity	-0.1727	0.01	***	-0.0609	0.00	***
Foreign eq.	0.0519	0.02	**	0.0131	0.01	***
F. gov bond	0.2279	0.11	**	0.0502	0.01	***

Pls note ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

We also applied fund-by-fund tests, which give support to the random regression results. The differences mainly stem from the significance levels in the coefficient values. Table 3 reports the statistical results of TM and HM methods, at the fund level. The results include the average market timing and standard deviation estimations of 101 provident funds and the proportion of the funds that display positive, positive and significant, negative, negative and significant market timing. Findings of both methods, in Table 3, reinforce the conclusion that provident funds have significant negative timing ability on domestic equities while on average they display positive market timing on government bonds. We observe, most strikingly, that more than 60% of the provident funds fail to anticipate the market trends in the Israeli stock exchange. On the other hand, some timing ability seems to exist in government bonds. According to TM and HM methods, 41% and 19% of the provident funds exhibit significant and positive timing on government bond markets, respectively and those funds of positive market timing are almost six folds of those of negative timing. However, there is not enough statistical evidence of market timing in corporate bonds and foreign investments. According to both models, only 11% of the funds display timing ability in corporate bonds. As for foreign investments, the results are mixed but nevertheless, less than 20% of the funds succeed to time the foreign equities and /or the bond markets. According to TM measure, 17% of the funds have statistically significant positive coefficients in foreign equities while only 2% do so in foreign bond markets. On the other hand, HM measure suggests successful timing in foreign equities for only 7.9% of the funds as opposed to 10.9% in foreign bonds. The average alpha, which indicates the stock selection ability, is positive but very small. Indeed, less than half of the funds, on average, generate a positive and significant alpha, while there are no funds with a significant negative alpha. This evidence implies that, for some funds, stock selection might explain a substantial portion of the abnormal returns.

Table 3. Timing results in multiple asset classes: returns based

PANEL A: Equation (1)		TM Results										
Coefficients	Gov. bond		Firm bond		Equity		Equity abroad		Gov. abroad		Overall	
	β_1	γ_1	β_2	γ_2	β_3	γ_3	β_4	γ_4	β_5	γ_5	α	R^2
Average	0.224	2.847	0.351	0.23	0.139	-0.173	0.04	0.052	-0.009	0.228	0.001	0.87
Stdev	0.212	4.673	0.172	1.141	0.081	0.162	0.032	0.253	0.02	0.582	0.001	0.08
positive	92.1%	81.2%	97.0%	54.5%	96.0%	8.9%	88.1%	63.4%	30.7%	67.3%	99.0%	
pos& sig*	80.2%	40.6%	97.0%	10.9%	89.1%	3.0%	77.2%	16.8%	5.0%	2.0%	42.6%	
negative	7.9%	18.8%	3.0%	45.5%	4.0%	91.1%	11.9%	36.6%	69.3%	32.7%	1.0%	
neg& sig*	2.0%	5.9%	3.0%	4.0%	0.0%	63.4%	2.0%	5.9%	5.0%	0.0%	0.0%	

PANEL B: Equation (2)		HM Results										
Coefficients	Gov. bond		Firm bond		Equity		Equity abroad		Gov. abroad		Overall	
	β_1	γ_1	β_2	γ_2	β_3	γ_3	β_4	γ_4	β_5	γ_5	α	R^2
Average	0.182	0.111	0.325	0.038	0.17	-0.061	0.036	0.013	-0.033	0.05	0.001	0.87
Stdev	0.216	0.202	0.172	0.11	0.085	0.039	0.026	0.039	0.03	0.056	0.001	0.08
positive	87.1%	71.3%	97.0%	62.4%	100.0%	7.9%	93.1%	71.3%	15.8%	86.1%	91.1%	
pos& sig*	45.5%	18.8%	93.1%	10.9%	94.1%	1.0%	60.4%	7.9%	0.0%	10.9%	26.7%	
negative	12.9%	28.7%	3.0%	37.6%	0.0%	92.1%	6.9%	28.7%	84.2%	13.9%	8.9%	
neg& sig*	0.0%	2.0%	2.0%	2.0%	0.0%	74.3%	0.0%	2.0%	5.9%	0.0%	0.0%	

*Tests are carried at 5% significance

4.2 Holdings Based Method

Table 4 reports the overall random regression results of the holdings based approach. As earlier mentioned in the Methodology section, we looked to market timing as a function of fund managers' over/underweighting actions of asset class weights relative to policy and we checked if these weights could predict the respective future market returns. To this end, we used two equations, for which the results are presented in Panel A and B. Panel A displays the market timing results in government bonds, corporate bonds and the equity markets separately and assumes that these markets are independent of each other. On the other hand, Panel B shows market timing ability in equities with respect to other markets, based on the more realistic assumption that equity and bond markets are interrelated as well as domestic and international markets. Therefore, managers could be considering various market trends in their investment decisions. In line with the findings in Table 2, the random regressions of the holdings based approach for government bonds and equities in Panel A of Table 4 indicate negative market timing in equities and successful market timing in government bonds for the Israeli provident funds, at 1% significance. The only exception is the timing result for corporate bonds, which is strongly negative in contrast to return-based analyses.

Table 4. Multi asset class random regression results: holdings based method

	PANEL A: Three asset class results			PANEL B: Equity asset class results		
	Single Index Holdings Model			Multi Index Holdings Model		
	Timing coefficient	Standard dev.	Significance	Timing coefficient	Standard dev.	Significance
Gov. bond	0.4089	0.08	***	-0.1961	0.04	***
Firm bond	-0.2281	0.04	***	-0.1234	0.03	***
Equity	-0.0616	0.01	***	-0.0891	0.01	***
Foreign eq.				0.0626	0.01	***
F.gov.bond				-0.1981	0.01	***

Pls note ***,** and * denote significance at the 1%, 5% and 10% levels, respectively.

The strong negative timing coefficient for domestic equities, in Panel B of Table 4, once again confirms that Israeli provident funds are unsuccessful in predicting the Israeli equity market movements in the right direction. However, there is also a strong indication of successful market timing in bonds and foreign equities. This is because "excess policy" equity class weights exhibit a positive relation with future foreign equity returns and an inverse relation with the returns from the domestic government bonds, corporate bonds and international government bonds. The negative average coefficient estimates for bonds signify that managers increase their holdings in equities ahead of a fall in government and/or corporate bonds or decrease their position in equities before a rise in the bond markets. This is a striking finding, showing that managers could be anticipating the bond markets correctly and capitalizing on a negative relation between the bonds and equities. During periods of economic expansion, bonds and the stock market trade indeed inversely as they are competing for capital. When there is optimism about economic growth, money moves from the safety of the bond market to riskier stocks and the stock market rallies lead to rising yields and lower bond values. However, stocks and bonds seem to be moving together in Panel B. This tends to happen in economic recoveries when the central bank keeps down interest rates to stimulate the economy and when the inflationary pressures are weak. Moreover, a bear market in stocks, especially in an emerging market, could lead to erosion in the values of other investments: the bond market segments could be exposed to credit risk and be in jeopardy of price declines. Hence, ability of market timing in bonds do not always lead to successful market timing in stocks, which is one of the main result of our analysis for Israeli provident funds.

Table 5 summarizes the fund-by-fund statistics according to the holdings based method. In both Panel A and Panel B, we observe more than 80% of the funds show negative equity market timing and more than 30% of the funds are significantly negative (except for foreign equities in Panel B). The multiindex model in Panel B provides us a tool to separate timing in domestic equities from that of foreign equities. According to Panel B, 75% of the funds have positive market timing for international equities but only 7% are significantly positive. All the other asset classes have very low significance levels to support the existence of market timing. Hence, the strongest conclusion from Table 5 is that whether managers take into account trends in other markets or not, they seem to fail anticipating how domestic equity markets will perform.

Table 5. Multi asset class timing results: holdings based method

PANEL A: Timing in three asset classes: single market index model- Equation (3)						
Coefficients	1-Gov.bond		2-Firmbond		3- Equity	
	γ_1	α_1	γ_2	α_2	γ_3	α_3
Average	0.409	- 0.027	-0.228	0.096	-0.062	- 0.020
Stdev	0.556	0.054	0.39	0.054	0.05	0.033
Positive	89.1%	30.7%	33.7%	97.0%	15.8%	24.8%
Pos & sig*	4.0%	21.8%	1.0%	96.0%	3.0%	19.8%
Negative	10.9%	69.3%	66.3%	3.0%	84.2%	75.2%
Neg & sig*	0.0%	64.4%	11.9%	1.0%	31.7%	69.3%

PANEL B: Timing in equities: multiple market index model - Equation (4)

Coefficients	Gov.bond γ_1	Firmbond γ_2	Equity γ_3	Foreign eq. γ_4	F.gov.bond γ_5	α
Average	-0.198	-0.125	-0.09	0.063	-0.2	-0.018
Stdev	0.196	0.212	0.072	0.105	0.16	0.034
Positive	12.9%	26.7%	10.9%	75.2%	12.9%	22.8%
pos & sig*	0.0%	0.0%	0.0%	6.9%	0.0%	15.8%
Negative	87.1%	73.3%	89.1%	24.8%	87.1%	77.2%
neg & sig*	0.0%	2.0%	30.6%	1.0%	32.7%	67.3%

*Indicate statistical significance at the 5% confidence level.

5. Conclusion

In this paper, we used 15 years of monthly holdings and returns data on 101 funds that represents around 60% of the Israeli provident fund industry to study the timing ability of these funds. Our database contains funds' monthly holdings in government bonds, corporate bonds, equity and the monthly returns of benchmark indices for these holdings.

Our study differs from previous studies in both the type of data and the methodology used. Most of the previous literature concentrated on equity market timing or total market timing. They employed a database that includes only publicly traded stock and ignored the contribution of other instruments to timing decisions. Therefore, any conclusions about managers' timing decisions were incomplete. We tested market timing ability in various investment categories to see how different kinds of investments influence the overall timing performance and from where the negative or positive timing performance originates. Hence, managers should be able to increase active management on investment categories they succeed to predict correctly and reduce actions on those they are unable to foresee.

We used two multi-asset class return based methods, with reference to the original work of TM (1966) and HM (1981) and an alternative holdings based method. In the holdings based method, we calculated market timing as a function of overweighting and underweighting in each asset class relative to preset long-term policy weights. Furthermore, we checked our results under the more realistic assumption that managers consider the expected performance of various competing markets before deciding to invest in any asset class or instrument. Hence, we used a multiple market index model for equities, including foreign indices.

Examining the results on the asset class level shows that the majority of the negative impact on returns comes from changing exposures to stocks. We find that domestic equity decisions result in negative timing performance by all the measures used. We also see some evidence of positive timing from government bond decisions. Finally, we observe that managers might be using their market timing ability in bonds to predict future stock movements, assuming an inverse relation between the two markets. However, we show that managers are unable to capitalize on their bond market predictions to time the equity markets successfully.

6. Limitations and Recommendations

We employed the broad market indices as market timing factors in both the return and holding based approaches. Some earlier models incorporated variables that are known to predict equity market returns such as market size and book to market ratio (Fama-French three-factor model) and one-year momentum (Carhart, 1997). Ferson and Schadt (1996) showed that employing macro variables as measures of public information changes the conclusions about timing ability. More recently, Gruber et al. (2012) found evidence that timing results change when funds' changing exposures to small stocks or higher growth stocks are taken into account. Therefore, introducing other factors into our timing models, including various macro-economic indicators such as inflation and exchange rates and/or some stock specific indicators such as size and book to market ratio could contribute to our analysis. Another limitation in our research was the use of monthly data. We implicitly assumed that managers are making timing decisions on a one-month horizon. Using daily data instead of monthly data could strengthen our market timing results since it increases the frequency of observations and reduces the bias of interim trading.

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Notes

Note 1. Their objective was to verify whether the proportion allocated to an asset class changes at time t in anticipation of positive or negative return in that asset class at time $t+1$.

Note 2. We performed Granger Causality tests for equations 3 & 4 after running VAR in STATA. We found that monthly equity and corporate bond market returns at time $t+1$ significantly affect (granger-cause) the equity and corporate bond asset class allocations at time t , respectively in equation 3. We did not find a significant relation in the other direction (allocation decisions in any asset class effecting the future market returns). Granger Causality tests for equation 4 yielded the same results.