On the performance of KiwiSaver funds

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Abstract

Purpose – This paper aims to investigate the risk-adjusted performance of the KiwiSaver Growth funds for the period 2007-2013 in New Zealand.

Design/methodology/approach – Performance attribution regressions are used to measure risk-adjusted performance of KiwiSaver funds.

Findings – This paper found that there is no evidence of systematic risk-adjusted outperformance of KiwiSaver Growth funds, and in several cases, there is evidence of significant underperformance. This paper further reports substantial variation in the amount of risk-taking, and local and international stock market exposure of KiwiSaver Growth funds.

Originality/value – KiwiSaver is becoming an increasingly important investment vehicle for many New Zealanders saving for retirement. This is the first paper that considers the performance of KiwiSaver funds.

Keywords KiwiSaver, Performance measurement, Mutual funds

Paper type Research paper

1. Introduction

The KiwiSaver scheme, which is predominantly a work-based, voluntary pension system, was introduced on July 1, 2007, in New Zealand. KiwiSaver is a subsidised, defined contribution investment scheme, with the minimum contribution rate currently set at 6 per cent and divided equally between the employee and employer. There are also some marginal tax credits for employees[1].

KiwiSaver funds have come to play an important role in the New Zealand financial landscape in recent years. Since the scheme's inception, investors have gradually realised the importance of investing in KiwiSaver. As of the middle of 2013, assets in KiwiSaver funds exceeded NZ$15 billion, with more than 2.1 million investors. One of the main aims of the New Zealand Government when introducing the KiwiSaver scheme was to increase the long-term savings of the public and encourage them to provide for a better retirement, which, to a certain extent, has been met[2].

To date, there has been very limited academic research on the KiwiSaver pension scheme, KiwiSaver fund providers and KiwiSaver investors. The main reason is undeniably the young age of this particular fund industry and the lack of long-term data. There are, however, a couple of recent studies that examine several relevant issues. Thomas and Matthews (2014) investigate the determinants of fund and member flows among KiwiSaver funds. The authors find that, on average, there is a positive relation between performance and both types of flow. However, they also observe a positive relation between performance and outflow that could not be explained. Thomas and

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Matthews further report inconclusive results when investigating the influence of the size of a fund and the number of investors on fund flows.

In another paper, Zhang (2014), using a unique proprietary data set of 405,107 individual KiwiSaver accounts, investigates the impact that financial advice has on the asset allocation decision of investors. Her findings show that:

- women, older investors and investors with relatively higher levels of wealth appear to obtain financial advice more than others;
- those investors who receive advice hold riskier assets in their portfolios, less cash and bonds and more property and equity; and
- that differences in the performance of the two groups, advised and non-advised investors, are marginal over the five-year period examined.

Academic studies on various characteristics of mutual funds, and especially their performance, are abundant[3]. Based on the extant literature, we can assert, in a nutshell, that most mutual funds underperform their respective market index (Fama and French, 2008), and there should be no premium paid for active fund management (Malkiel, 1995; Carhart, 1997). There is further strong evidence that fund performance deteriorates with fund size (Chen *et al.*, 2004) and fees (Gil-Bazo and Ruiz-Verdu, 2009). There are, however, some studies that find that fund managers exhibit some skills. For example, there is certain evidence of short-term persistence in funds' performance (Hendricks *et al.*, 1993) and that money flows to past good performers (Del Guerico and Tkac, 2002). Investors are also able to display some fund selection ability, as they tend to invest in funds with successive good performance (Zheng, 1999). Although some of the issues raised in the abovementioned studies have been investigated in the context of KiwiSaver, to our knowledge, our paper is the first to examine the performance of KiwiSaver funds.

In this paper, we investigate the risk-adjusted performance of KiwiSaver Growth or Equity funds[4]. The sample for our analysis consists of all actively traded growth/equity funds over the period September 2007-April 2013 (in total 19 funds). We use both the domestic and global versions of the traditional market model (capital asset pricing model or CAPM) and the Fama and French (1993) multi-factor model to measure risk-adjusted performance.

Our analysis shows that the funds that classify themselves as growth, equity or aggressive differ considerably in their degree of risk-taking, whether this is measured by standard deviation or by market beta. In addition, we find no evidence that equity/growth KiwiSaver funds yield any outperformance based on the various benchmark models we use, and in some cases, we document significant underperformance. In a domestic context, we find no evidence that KiwiSaver funds follow a specific investment style (in terms of size or value). In a global context, we find some evidence of style investing, where several funds in our sample follow a strategy of predominantly investing in large-caps, and several funds investing in growth stocks[5].

The findings of our study have important implications for KiwiSaver investors. First, the finding that growth, equity and aggressive funds differ substantially in their degree of risk-taking implies that KiwiSaver investors should be very cautious when choosing between different growth funds purely based on their performance. Our finding also implies that in the long run, investors in different growth funds could end up with

significant differences in the values of their portfolios. Second, the finding that none of the funds are able to outperform the local and global benchmarks implies that investors should be cautious about the fees that they are charged for their investments, especially if funds charge these fees for self-proclaimed superior investment skills (for which we find no evidence). For investors to better understand what they are investing in (the degree of risk-taking) and what they are paying fees for (proclaimed outperformance or not) is important for their investment decisions, their retirement savings and the future of the New Zealand economy in general.

The rest of this paper proceeds as follows. Section 2 details the methodologies used in this paper. Section 3 describes our data and the selection of our sample. Section 4 presents the empirical results, and Section 5 concludes.

2. Methodology

We aim to investigate the risk-adjusted outperformance of KiwiSaver funds. This analysis will only be conducted for growth, equity and aggressive funds, as these funds invest most heavily into equity, and the performance measurement literature on equity funds is most developed. In the first instance, we assess performance in a domestic context, by comparing the performance of funds relative to the New Zealand stock market. Second, we examine performance in a global context.

The first model we consider is a comparison of the performance of each fund in our sample with the local market index. We run the following regression:

$$R_t = \alpha^L + \beta^L NZXRF_t + \varepsilon_t, \tag{1}$$

where R_t is the return on a specific fund in excess of the risk-free rate (the 90-day bank bill rate), and $NZXRF_t$ is the return on the New Zealand market index in excess of the risk-free rate. The coefficient β^L captures the exposure of the fund relative to the market index, and thus provides a measure of the market risk of a fund, and α^L captures the risk-adjusted out- or underperformance relative to the local market index.

The model in equation (1) assumes that only market risk is priced. However, in addition to market risk, there are other well-established factors that are known to affect the cross-section of stock returns, and therefore the performance of mutual funds. First, Banz (1981) shows that size has an important role in explaining differences in the cross-section of stock returns. Second, Statman (1980) and Rosenberg *et al.* (1985) show that book-to-market values also have an important role in explaining the cross-section of stock returns. Fama and French (1992) evaluate the importance of these two factors in explaining the cross-section of US stock returns and find that, on average, small firms earn higher average stock returns than large firms, and value stocks (firms with high book-to-market values) earn higher average returns than growth stocks (firms with low book-to-market values). Given that these two effects are observed persistently over time throughout the cross-section of stock returns, and that these are known strategies for generating "outperformance", we need to control for them when assessing the performance of mutual funds and, in this case, KiwiSaver Growth funds. We therefore augment the CAPM in equation (1) with these factors and estimate the so-called Fama and French (1993) three-factor model:

$$R_t = \alpha^L + \beta^L NZXRF_t + \gamma_1^L NZSMB_t + \gamma_2^L NZHML_t + \varepsilon_t, \tag{2}$$

where $NZSMB_t$ is the New Zealand size factor, and is constructed as a zero-investment portfolio that is long in small cap stocks and short in large cap stocks, and $NZHML_t$ is the New Zealand book-to-market factor and is constructed as a zero-investment portfolio that is long in high book-to-market stocks and short in low book-to-market stocks. The coefficient γ_1^L measures the exposure of the fund to the size factor, where a positive coefficient indicates that the fund follows an investment style tilted towards small cap firms, whereas a negative coefficient suggests that the fund has a greater exposure towards large cap firms. The coefficient γ_2^L measures the exposure to the book-to-market factor, where a positive coefficient implies that the fund has a greater exposure towards high book-to-market firms (value stocks), whereas a negative coefficient implies that the fund has a greater exposure towards low book-to-market firms (growth stocks). The coefficient α^L again provides a measure for risk-adjusted out- or underperformance of the fund after controlling for market risk, and the size and the book-to-market effects.

Next, we examine the performance of KiwiSaver funds in a global context, where we compare each fund to a global equity portfolio and perform a global CAPM regression of the form[6]:

$$R_t = \alpha^W + \beta^W RMRF_t + \varepsilon_t, \tag{3}$$

where $RMRF_t$ is the return on the global market portfolio (in NZ dollars) in excess of the risk-free rate. In this regression, β^W captures the exposure of the fund to the global market index, and thus provides a measure of global market risk, and α^W captures the out- or underperformance relative to the global market index.

We also examine the risk-adjusted performance in the context of the global Fama and French (1993) three-factor model, and augment the CAPM with the global size and book-to-market factors, i.e.:

$$R_t = \alpha^W + \beta^W RMRF_t + \gamma_1^W SMB_t + \gamma_2^W HML_t + \varepsilon_t, \tag{4}$$

where SMB_t is the global size factor constructed as a zero-investment portfolio that is long in small cap stocks and short in large cap stocks, and global HML_t is a zero-investment portfolio that is long in high book-to-market stocks and short in low book-to-market stocks[7]. We are again interested in the magnitude of α^W which captures the risk-adjusted out- or underperformance of a specific fund.

3. Data

Data on KiwiSaver funds are obtained from Morningstar for the period September 2007 to April 2013. These data contain monthly returns on all KiwiSaver funds that are net of fees. Although data on all funds are available (Morningstar has data for 139 KiwiSaver funds that classify themselves as conservative, balanced, moderate, etc.), we focus on those funds with the greatest exposure to equity. These funds are often called "growth", "equity" or "aggressive" funds. In total, there are 19 different funds that classify themselves as such. It needs to be noted, however, that there is no regulation on the allocation that funds should have towards equity, or what constitutes a growth, equity or aggressive fund. However, the funds that we examine in this paper all have proclaimed allocations towards equity in excess of 60 per cent of their total investments. We exclude any other funds from this analysis (i.e. conservative, balanced, etc.), as those

funds typically allocate most of their investments to fixed-income securities, for which our benchmark models would not be appropriate.

In Table I, we provide summary statistics of the funds that we study in this paper. First, we note that there are substantial differences in the average returns of the funds over the sample period. The lowest average return was obtained by the SmartShares Growth fund (0.01 per cent), whereas the highest average return was obtained by the Brook Growth fund (5.91 per cent). These relatively low returns are a consequence of the sample period under investigation, which covers the Global Financial Crisis[8]. Second, we note that there is also a substantial difference between funds in terms of risk-taking. The fund with the highest standard deviation of returns was the Tower Equity fund (15.68 per cent), followed closely by the SmartShares Growth fund (15.58 per cent). The fund with the lowest standard deviation was the Westpac Growth fund (8.06 per cent), followed by the Brook Growth fund (8.72 per cent). The large difference in the risk (standard deviation), with the highest risk fund being nearly twice as risky as the lowest risk fund, suggests that the term "growth" fund is not a very informative description to investors who, based on their personal risk aversion and description of the fund, try to make a decision on what fund to invest in. The third observation from Table I is that over the sample period, there was an inverse relation between return and risk, that is the funds that performed well are those that had low standard deviations and vice versa. This may be due to the poor performance of equities during the sample period (Global Financial Crisis and European Debt Crisis) and the relatively strong performance of fixed-income securities.

Fund name	Obs.	Return (% p.a.)	SD (% p.a.)
AMP Aggressive	67	1.27	13.08
AMP Growth	67	1.90	10.91
AON Growth	67	3.96	13.78
ASB Growth	67	2.51	10.94
Brook Growth	67	5.91	8.72
Westpac Growth	67	3.94	8.06
Fidelity Growth	67	4.12	9.12
Fidelity Aggressive	67	3.80	11.61
Fisher Growth	67	5.34	12.80
Forsyth Barr Growth	58	2.36	8.76
Grosvenor High Growth	67	0.62	11.94
Mercer High Growth	67	1.60	12.55
OnePath Growth	67	3.03	9.64
ANZ Growth	67	4.21	10.38
SIL Growth	67	4.38	10.37
Smart Growth	67	0.01	15.58
Staples Rodway Growth	66	4.29	9.20
Tower Growth	67	2.93	10.88
Tower Equity	67	0.44	15.68

Table I.
Descriptive statistics on KiwiSaver funds

Note: This table reports annualised average return and risk (SD) over the sample period. *Obs.* is the number of observations and *Return* and *SD* are the annualised average return and standard deviation, respectively

3.1 Domestic benchmark data

To examine the performance of KiwiSaver funds in a domestic context, we construct local benchmark variables. We construct these local benchmark variables following Bauer *et al.* (2006). First, we obtain total return data on all New Zealand domestic equities from DataStream, and construct a local (value-weighted) market index by considering stocks with a market capitalisation of at least NZD 5 million. The excess market index (NZXRF) is computed by subtracting the risk-free rate (90-day bank bill rate) from the returns of this local index. The risk-free rate data are obtained from the Reserve Bank of New Zealand (www.rbnz.govt.nz).

To construct the local size factor (NZSMB), we rank stocks based on their market capitalisation at the end of each year. The 20 per cent of smallest stocks are assigned to the small portfolio, whereas the 80 per cent of the largest stocks are assigned to the large portfolio. The NZSMB factor is then constructed by computing the difference between the small cap and the large cap portfolio.

For the local book-to-market factor (NZHML), we follow a similar approach. At the end of each year, we rank the stocks in our sample by book-to-market value. The 30 per cent of stocks with the highest book-to-market value are assigned to the high book-to-market portfolio, whereas the 30 per cent of stocks with the lowest book-to-market value are assigned to the low book-to-market portfolio. The NZHML factor is then computed as the difference between the high minus low portfolio. Both the NZSMB and the NZHML factors are value-weighted portfolios that are rebalanced annually.

In Table II, Panel A, we provide some summary statistics for the local benchmarks. The first column shows the excess return of the value-weighted New Zealand market index over the New Zealand 90-day Bank Bill rate. As can be seen excess returns, on average, are negative at −0.43 per cent p.a., suggesting that an investment in a risk-free security would have generated a higher return than the market. The market index has a standard deviation of 12.21 per cent and has slight negative skewness (implying that negative returns tend to be of greater magnitude than positive returns). The NZSMB factor over the sample period has a negative return of −1.48 per cent p.a., suggesting that over the sample period, small cap firms underperformed relative to large cap firms. Of the three factors, the NZSMB has the highest standard deviation of 17.21 per cent, and the NZSMB has slightly positive skewness, but kurtosis is close to 3, suggesting that the distribution of NZSMB has no fat tails. Finally, the NZHML factor had an average annual return of 5.83 per cent p.a. and a standard deviation of 13.07 per cent. This suggests that, over the sample period, value stock have earned higher returns than growth stock. Skewness is slightly positive, while kurtosis is slightly greater than 3.

3.2 Global benchmark data

We obtain data on global benchmarks from Kenneth French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\-library.html). This website contains data on the excess returns on the global market portfolio (RMRF), and the global factors on SMB and HML, which are constructed on the basis of data obtained from 23 countries around the world. We convert the returns on these portfolios to New Zealand dollars.

In Panel B of Table II, we report summary statistics for the global risk factors. For the excess return of the global market portfolio, we find an average return of 3.23 per cent p.a., with a standard deviation of 13.68 per cent. Skewness is close to zero, and there is

	NZXRF	NZSMB	NZHML
Panel A: Domestic risk factors			
Mean (%)	−0.43	−1.48	5.83
SD (%)	12.21	17.21	13.07
Skewness	−0.930	0.657	0.336
Kurtosis	3.805	3.202	3.643
	RMRF	SMB	HML
Panel B: Global risk factors			
Mean (%)	3.23	0.84	0.23
SD (%)	13.67	17.22	17.41
Skewness	0.015	0.595	0.344
Kurtosis	3.532	5.093	3.645

Notes: This table reports summary statistics for the various benchmark portfolios. Panel A reports the results for the domestic risk factors, where NZXRF is the excess return for the New Zealand market; NZSMB is the New Zealand size factor; and NZHML is the New Zealand book-to-market factor. Panel B reports the results for the global risk factors, where RMRF is the excess return of the global market portfolio; SMB is the global size factor; and HML is the global book-to-market factor

Table II.
Summary statistics on benchmark portfolios

some excess kurtosis in these returns. The return on the global SMB portfolio is close to zero at 0.84 per cent p.a., showing a slight outperformance of global small caps over global large caps. The standard deviation of the global SMB factor is 17.22 per cent, skewness is slightly positive at 0.595 and there is evidence for excess kurtosis, with kurtosis of 5.093. The global HML factor shows a marginally positive return at 0.23 per cent p.a. and a standard deviation of 17.41 per cent. Again skewness is positive and kurtosis is slightly greater than 3 at 3.645.

4. Empirical findings

In this section, we assess the risk-adjusted performance of KiwiSaver funds, by comparing them with various benchmarks.

We start the analysis by looking at the performance of the funds in our sample, relative to the New Zealand market index. In Table III, we report the estimation results for equation (1), where we compute robust standard errors using a Newey–West correction[9]. The first column of this Table shows the results for α^L, the risk-adjusted outperformance over the local market index. For 7 out of the 19 cases, we observe that α^L is positive, but in none of the cases do we observe that α^L is significantly positive. This suggests that there is no significant evidence for outperformance of KiwiSaver funds relative to the New Zealand market index. For 12 funds we find that α^L is negative, and in only one case (Forsyth Barr Growth) do we observe a significant negative α^L.

The next column reports the estimates for β^L, the degree of domestic market risk. The lowest market risk for Staples Rodway Growth (0.495), and the highest level of market risk for SmartShares Growth (1.078)[10]. This again shows that there is substantial variation in the degree of risk-taking (as was observed earlier for the standard deviations), and this large variation in risk-taking can have an enormous impact on the total wealth accumulation that occurs until retirement[11].

Fund name	α^L	NZXRF	$R^2_{adj(\%)}$
AMP Aggressive	−0.222 (−0.82)	0.759*** (6.00)	48.36
AMP Growth	−0.169 (−0.76)	0.642*** (5.99)	49.48
AON Growth	0.003 (0.01)	0.811*** (5.81)	49.71
ASB Growth	−0.119 (−0.56)	0.738*** (9.59)	65.06
Brook Growth	0.163 (0.67)	0.498*** (5.33)	47.50
Westpac Growth	−0.001 (−0.01)	0.595*** (19.04)	76.79
Fidelity Growth	0.013 (0.07)	0.549*** (6.50)	52.39
Fidelity Aggressive	−0.011 (−0.04)	0.693*** (8.47)	51.43
Fisher Growth	0.119 (0.32)	0.793*** (6.04)	55.12
Forsyth Barr Growth	−0.403* (−1.74)	0.640*** (6.42)	58.46
Grosvenor High Growth	−0.275 (−1.08)	0.781*** (9.59)	62.04
Mercer High Growth	−0.193 (−0.74)	0.848*** (8.51)	65.44
OnePath Growth	−0.076 (−0.50)	0.710*** (14.82)	76.79
ANZ Growth	0.022 (0.13)	0.744*** (13.34)	73.22
SIL Growth	0.037 (0.21)	0.743*** (13.53)	73.23
Smart Growth	−0.323 (−1.27)	1.078*** (11.77)	69.41
Staples Rodway Growth	0.020 (0.09)	0.495*** (4.07)	41.49
Tower Growth	−0.083 (−0.43)	0.765*** (10.84)	70.69
Tower Equity	−0.288 (−0.91)	0.990*** (8.86)	57.79

Notes: This table reports regression results for equation (1). The benchmark (RMRF) is the global market portfolio obtained from Kenneth French's website. α^L measures the risk-adjusted performance relative to the benchmark, NZXRF is the excess return on the domestic market portfolio and R^2_{adj} measures the goodness of fit. Newey–West corrected *t*-statistics are reported in parentheses and *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Table III. Performance measurement using the domestic CAPM

The last column of Table III reports the adjusted R^2 of the regression. As with the large variation in market risk, we observe a wide variation in the fit of the model, where R^2's range from 41.49 per cent (Staples Rodway) to 76.79 per cent (Westpac and OnePath), suggesting that some funds tend to invest more in the New Zealand market than others.

In Table IV, we report the regression results for the domestic three-factor model. The results show that only in three cases is α^L positive, but none of these alphas are significant. The remaining 16 funds all have negative alphas, with one case (Forsyth Barr Growth) having a negative and significant α^L. As with the domestic version of the CAPM, the variation in market risk is wide, varying from 0.464 (Brook Growth) to 1.144 (SmartShares Growth). For the NZSMB factor, we find 13 positive coefficients and 6 negative coefficients. However, none of these are significant, suggesting that KiwiSaver funds do not follow a domestic size-based strategy. For the NZHML, we find 18 positive coefficients and 1 negative coefficient. However, again none of these coefficients are significant, suggesting that KiwiSaver funds do not follow a domestic strategy based on book-to-market values.

We continue our analysis by comparing the performance of each fund with the performance of a global market index and report the results for this regression in Table V. Our first coefficient of interest is the outperformance of each fund relative to the global market index. We find that in all but one case, α^W is negative, and in one case, we have weak significant evidence (Grosvenor Growth). Hence the findings of our

Table IV.
Performance measurement using the domestic Fama and French (1993) three-factor model

Fund name	α^L	NZXRF	NZSMB	NZHML	$R^2_{adj(\%)}$
AMP Aggressive	−0.266 (−0.95)	0.829*** (5.92)	0.099 (1.49)	0.126 (0.96)	50.84
AMP Growth	−0.210 (−0.91)	0.698*** (5.98)	0.076 (1.39)	0.110 (1.00)	51.82
AON Growth	−0.058 (−0.18)	0.891*** (5.57)	0.106 (1.54)	0.164 (1.24)	53.32
ASB Growth	−0.157 (−0.74)	0.761*** (9.07)	0.013 (0.20)	0.085 (1.20)	65.13
Brook Growth	0.178 (0.77)	0.464*** (5.02)	−0.054 (−0.90)	−0.050 (−0.86)	47.92
Westpac Growth	−0.017 (−0.13)	0.594*** (20.19)	−0.015 (−0.27)	0.029 (0.62)	76.27
Fidelity Growth	−0.067 (−0.38)	0.535*** (7.70)	−0.095 (−1.26)	0.138 (1.64)	55.64
Fidelity Aggressive	−0.033 (−0.14)	0.661*** (8.49)	−0.081 (−0.86)	0.021 (0.16)	51.12
Fisher Growth	0.084 (0.25)	0.836*** (5.76)	0.053 (0.67)	0.090 (0.79)	55.40
Forsyth Barr Growth	−0.427* (−1.82)	0.685*** (5.20)	0.083 (1.22)	0.019 (0.38)	59.89
Grosvenor High Growth	−0.299 (−1.22)	0.792*** (9.69)	0.002 (0.02)	0.051 (0.56)	61.15
Mercer High Growth	−0.245 (−0.96)	0.904*** (7.56)	0.065 (1.18)	0.131 (1.65)	67.61
OnePath Growth	−0.079 (−0.51)	0.718*** (13.37)	0.014 (0.32)	0.011 (0.20)	76.15
ANZ Growth	−0.007 (−0.04)	0.764*** (12.02)	0.013 (0.21)	0.065 (1.18)	73.17
SIL Growth	0.009 (0.05)	0.763*** (12.14)	0.015 (0.25)	0.064 (1.16)	73.18
Smart Growth	−0.369 (−1.44)	1.144*** (10.42)	0.091 (1.10)	0.126 (1.32)	71.09
Staples Rodway Growth	−0.002 (−0.01)	0.517*** (3.62)	0.027 (0.45)	0.048 (0.58)	40.50
Tower Growth	−0.126 (−0.66)	0.779*** (9.75)	−0.009 (−0.13)	0.088 (1.14)	70.78
Tower Equity	−0.316 (−1.00)	1.001*** (8.19)	−0.003 (−0.03)	0.058 (0.48)	56.68

Notes: This table reports regression results for equation (2), where the CAPM is augmented with the global *SMB* and *HML* factors from Kenneth French's website. α^L measures the risk-adjusted performance relative to the benchmark, NZXRF is the excess return on the local market portfolio, NZSMB is the New Zealand size factor, NZHML is the New Zealand value factor and R^2_{adj} measures the goodness of fit. Newey–West corrected *t*-statistics are reported in parentheses and *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Fund name	α^W	RMRF	$R^2_{adj(\%)}$
AMP Aggressive	−0.309 (−0.77)	0.504*** (3.95)	24.46
AMP Growth	−0.243 (−0.72)	0.431*** (4.10)	25.56
AON Growth	−0.083 (−0.17)	0.502*** (4.38)	21.63
ASB Growth	−0.232 (−0.85)	0.680*** (9.91)	65.20
Brook Growth	0.078 (0.35)	0.512*** (5.82)	59.54
Westpac Growth	−0.088 (−0.45)	0.521*** (12.21)	69.61
Fidelity Growth	−0.085 (−0.53)	0.594*** (8.45)	72.91
Fidelity Aggressive	−0.132 (−0.51)	0.734*** (11.48)	68.67
Fisher Growth	−0.002 (−0.01)	0.728*** (6.35)	54.83
Forsyth Barr Growth	−0.270 (−0.84)	0.457*** (4.92)	42.47
Grosvenor High Growth	−0.406* (−1.82)	0.792*** (11.32)	75.59
Mercer High Growth	−0.298 (−0.72)	0.623*** (5.90)	41.11
OnePath Growth	−0.171 (−0.63)	0.566*** (7.61)	57.36
ANZ Growth	−0.082 (−0.29)	0.623*** (9.40)	60.32
SIL Growth	−0.067 (−0.24)	0.621*** (9.39)	60.09
Smart Growth	−0.446 (−0.94)	0.717*** (5.67)	35.54
Staples Rodway Growth	−0.034 (−0.13)	0.449*** (5.68)	40.37
Tower Growth	−0.186 (−0.61)	0.613*** (7.76)	53.29
Tower Equity	−0.437 (−1.18)	0.891*** (7.86)	55.24

Notes: This table reports regression results for equation (3). The benchmark (RMRF) is the global market portfolio obtained from Kenneth French's website. α^W measures the risk-adjusted performance relative to the benchmark, RMRF is the excess return on the global market portfolio and R^2_{adj} measures the goodness of fit. Newey–West corrected *t*-statistics are reported in parentheses and *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Table V. Performance measurement using the global CAPM

performance analysis relative to the global benchmark are in line with the domestic analysis, in the sense that we find no evidence for outperformance of KiwiSaver funds.

The second column measures the exposure that each fund has to the global market portfolio (β^W), as this represents the total amount of global market risk in a fund. We note a wide variation in the global market risk, with Tower Equity having the largest exposure (0.891) and AMP Growth having the lowest exposure (0.431), which is less than half that of Tower Equity. All other funds are dispersed relatively evenly between these two extremes. This finding again demonstrates the large variation in risk-taking attitude and exposure among KiwiSaver funds. We also note the wide variation in the fit of this model, where R^2s range from 21.63 per cent (Aon) to 75.59 per cent (Grosvenor), suggesting that for some funds, the global CAPM provides a good fit, while for others, it provides a poor fit.

In Table VI, we report the results for the global Fama and French three-factor model, which augments the global CAPM by including two additional factors that capture the global size and the value effects, respectively. When we consider the α^W for these funds, we note that in all but one case, they are negative and in eight cases, they are significantly negative. On the whole, this suggests that after controlling for these two additional risk factors, a substantial proportion of KiwiSaver growth funds significantly underperform relative to these international benchmarks.

The results for the exposures to the market portfolio are broadly in line with the results for the domestic CAPM. The lowest β^W is 0.511 (Staples Rodway Growth),

Table VI. Performance measurement using the global Fama and French (1993) three-factor model

Fund name	α^W	RMRF	SMB	HML	$R^2_{adj(\%)}$
AMP Aggressive	−0.381* (−1.81)	0.634*** (8.25)	−0.118 (−1.47)	−0.408*** (−3.80)	65.67
AMP Growth	−0.302* (−1.67)	0.537*** (8.37)	−0.099 (−1.43)	−0.333*** (−3.65)	65.24
AON Growth	−0.154 (−0.67)	0.633*** (8.40)	−0.212*** (−2.66)	−0.366*** (−2.92)	66.18
ASB Growth	−0.258** (−2.07)	0.737*** (21.29)	−0.258*** (−5.25)	−0.078 (−1.50)	89.79
Brook Growth	0.081 (0.40)	0.515*** (5.37)	−0.180 (−1.47)	0.077 (0.64)	64.03
Westpac Growth	−0.107 (−0.80)	0.560*** (19.96)	−0.122*** (−3.12)	−0.076* (−1.73)	84.43
Fidelity Growth	−0.089 (−0.81)	0.611*** (7.96)	−0.206*** (−3.37)	0.041 (0.65)	82.51
Fidelity Aggressive	−0.155 (−0.93)	0.783*** (16.62)	−0.169*** (−2.86)	−0.090 (−1.61)	81.15
Fisher Growth	−0.061 (−0.21)	0.827*** (9.25)	0.045 (0.54)	−0.377*** (−3.39)	72.99
Forsyth Barr Growth	−0.326* (−1.75)	0.551*** (7.35)	−0.048 (−0.62)	−0.239* (−1.89)	72.74
Grosvenor High Growth	−0.423*** (−3.74)	0.834*** (19.72)	−0.252*** (−2.67)	−0.027 (−0.39)	90.34
Mercer High Growth	−0.349* (−1.87)	0.724*** (12.84)	−0.285*** (−5.06)	−0.222** (−2.63)	82.63
OnePath Growth	−0.196 (−1.30)	0.621*** (14.65)	−0.226*** (−4.70)	−0.084 (−1.44)	83.50
ANZ Growth	−0.111 (−0.68)	0.683*** (18.52)	−0.222*** (−4.98)	−0.104** (−1.98)	85.43
SIL Growth	−0.095 (−0.59)	0.681*** (18.61)	−0.226*** (−5.00)	−0.101* (−1.91)	85.34
Smart Growth	−0.488* (−1.76)	0.811*** (14.09)	−0.463*** (−4.51)	−0.109 (−1.00)	70.94
Staples Rodway Growth	−0.054 (−0.31)	0.511*** (5.59)	−0.085 (−0.77)	−0.176 (−1.13)	59.94
Tower Growth	−0.233 (−1.49)	0.701*** (15.11)	−0.132** (−2.39)	−0.248*** (−3.55)	84.05
Tower Equity	−0.509*** (−2.86)	1.024*** (21.19)	−0.156** (−2.03)	−0.398*** (−4.62)	87.50

Notes: This table reports regression results for equation (4), where the CAPM is augmented with the global SMB and HML factors from Kenneth French's website. α^W measures the risk-adjusted performance relative to the benchmark, RMRF is the excess return on the global market portfolio, SMB is the global size factor, HML is the global value factor, and R^2_{adj} measures the goodness of fit. Newey–West corrected *t*-statistics are reported in parentheses and *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

whereas the highest β^W is 1.024 (Tower Equity). When we consider the factor loadings on SMB, we observe that in all but one case, these are negative, and in 13 of 19 cases, significantly so. This finding suggests that for the majority of funds, globally, the investment focus is more on large companies, rather than small companies. For the HML factor loading, we find predominantly negative loadings, which in 11 cases are statistically significant. This finding indicates that most of the funds have a significantly higher exposure to growth stocks (low book-to-market values) than to value stocks. The adjusted R^2s for the global three-factor model are substantially higher than for the global CAPM, and in all cases are well above 50 per cent. The best fit is for the Grosvenor High Growth fund (90.34 per cent), while the worst fit is for Staples Rodway Growth (59.94 per cent).

Finally, in Table VII, we provide a comparison between the goodness of fit of the different models that we have estimated (domestic CAPM, domestic three-factor model, global CAPM and global three-factor model). When we first compare the domestic CAPM to the domestic three-factor model, we note that there are only marginal improvements in model fit, if any. In 11 cases, the adjusted R^2 improves marginally, while in eight cases, the adjusted R^2 drops. Next, when we compare the global CAPM with the global three-factor model, we note that the adjusted R^2 increases in all cases and in most cases considerably. Hence, adding the global size and book-to-market factors to the global CAPM considerably increases model fit. When we compare the domestic CAPM with the global CAPM, we observe that in most cases, the domestic CAPM provides a better fit; however, the global three-factor model performs better than the

Fund name	$R^2_{CAPM,L}$ (%)	$R^2_{FF,L}$ (%)	$R^2_{CAPM,W}$ (%)	$R^2_{FF,W}$ (%)
AMP Aggressive	48.36	50.84	24.46	65.67
AMP Growth	49.48	51.82	25.56	65.24
AON Growth	49.71	53.32	21.63	66.18
ASB Growth	65.06	65.13	65.20	89.79
Brook Growth	47.50	47.92	59.54	64.03
Westpac Growth	76.79	76.27	69.61	84.43
Fidelity Growth	52.39	55.64	72.91	82.51
Fidelity Aggressive	51.43	51.12	68.67	81.15
Fisher Growth	55.12	55.40	54.83	72.99
Forsyth Barr Growth	58.46	59.89	42.47	72.74
Grosvenor High Growth	62.04	61.15	75.59	90.34
Mercer High Growth	65.44	67.61	41.11	82.63
OnePath Growth	76.79	76.15	57.36	83.50
ANZ Growth	73.22	73.17	60.32	85.43
SIL Growth	73.23	73.18	60.09	85.34
Smart Growth	69.41	71.09	35.54	70.94
Staples Rodway Growth	41.49	40.50	40.37	59.94
Tower Growth	70.69	70.78	53.29	84.05
Tower Equity	57.79	56.68	55.24	87.50

Notes: This table provides a comparison of the adjusted R^2s for the different benchmark models, where $R^2_{CAPM,L}$ is the adjusted R^2 for the domestic CAPM, $R^2_{FF,L}$ is the adjusted R^2 for the domestic three-factor model, $R^2_{CAPM,W}$ is the adjusted R^2 for the global CAPM and $R^2_{FF,W}$ is the adjusted R^2 for the global three-factor model

Table VII. Adjusted R^2 comparison

domestic three-factor model in all cases. Overall, the global three-factor model provides the best fit for all the KiwiSaver funds examined in this study.

5. Conclusions

This study investigates the performance of the KiwiSaver growth funds, i.e. those with the largest exposure to equity investments. Our study documents several important findings regarding KiwiSaver growth funds. First, we find no evidence for outperformance of the funds in our sample, when comparing their returns with commonly used benchmark models. In fact, in the case of the global three-factor model, we document significant underperformance for eight funds in our sample. Second, we note that there is great variation in the amount of risk-taking among the different funds in our sample, either based on standard deviations or based on domestic or global market risk. Finally, we note that KiwiSaver funds do not exploit the "size effect" or "value effect" in a domestic context, and the global three-factor model suggests that the funds in our sample predominantly invest in large cap stocks and growth stocks.

Our findings have important implications for KiwiSaver investors. First, the result that none of the funds are able to achieve risk-adjusted outperformance implies that investors need to be prudent about fund fees and should not pay high fees for self-proclaimed superior investment skills. Second, our findings on the different levels of risk-taking suggest that KiwiSaver investors should not treat all growth funds as equal and compare these funds purely based on returns. Investors should make an assessment of the actual risk involved in a particular fund. Alternatively, requirements for better disclosure regarding the degree of risk in a fund should be introduced. Further, the difference in levels of risk-taking implies that there may be huge variations in the total wealth accumulation of each growth fund when an investor retires. Finally, comparing performance of KiwiSaver funds relative to the risk of the funds is not straightforward and involves a reasonable understanding of statistics. It is questionable whether such a level of financial literacy can be expected from an average KiwiSaver investor.

One possible limitation of our study may be the relatively short sample period under analysis. It would be interesting to see whether performance of KiwiSaver funds will improve over time and whether risk levels of the different funds will converge.

Notes

1. Details of KiwiSaver are available at: www.kiwisaver.govt.nz
2. In New Zealand, there is evidence of negative savings among certain segments of society, with youth saving the least (Scobie and Henderson, 2009). Additionally, at the time of the introduction of KiwiSaver, less than 30 per cent of the active labour force was covered by some sort of retirement plan (Kritzer, 2007). The question of sufficient wealth accumulation and the adequacy of the current contribution rate has not yet been settled. For example, in a recent paper by MacDonald *et al.* (2012), the authors, applying stochastic simulation analysis, find that the current rate of 6 per cent is far too low to ensure New Zealanders have sufficient savings in the long term, a finding that contradicts the work of Le *et al.* (2009), who observe that most of the population aged between 45 and 64 have made sufficient provision for their retirement.

3. For an exhaustive analysis of various aspects of New Zealand mutual fund performance, see Bauer *et al.* (2006).
4. There is not a wide variety of KiwiSaver funds available to investors. Most fund providers offer four to five categories. For example, BNZ offers: cash, conservative, moderate, balanced, growth funds. These investment funds (to varying degrees based on their risk exposure) invest in cash, domestic bonds, international bonds, domestic equity, international equity and property. We have chosen to concentrate only on growth or equity funds (and, in some cases, aggressive funds), as they have the largest allocation of their assets in equity. The models applied in our paper are suitable for such funds and cannot be applied indiscriminately to other multi-asset funds.
5. Given the relatively small number of funds under consideration and the limited time frame available for examination, these results should be treated with some caution.
6. Although not all funds report their international asset allocation, some funds provide an indication of the allocation towards international assets. For instance, ASB Growth, Tower Growth, Mercer High Growth all state that 45 per cent of their fund is invested in international shares. AMP Growth claims to invest 60 per cent in international assets, and Forsyth Barr Growth allocates 70 per cent to international assets. These international asset allocations suggest that the use of an international benchmark model may be more appropriate than a purely domestic one.
7. For more details of these factors and their construction, please refer to: available at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data/library.html
8. Note that the Global Financial Crisis would affect both fund returns and benchmark returns. Hence, in the investigation of risk-adjusted performance, the Global Financial Crisis should not affect the relative performance of a fund to the benchmarks.
9. The Newey–West correction computes standard errors in a robust way, correcting for potential autocorrelation (which may be introduced by potential staleness in net asset values of the fund or staleness in the prices of the assets in which the fund invests) and heteroscedasticity in residuals.
10. The market risk provides a measure for the sensitivity of each fund to the movements in the stock market. For instance, for the Staples Rodway Growth fund, one would expect an increase (decrease) in the fund of 0.495 per cent when the market increases (decreases) by 1 per cent. For the SmartShares Growth fund, one would expect an increase (decrease) in the fund of 1.078 per cent when the market increases (decreases) by 1 per cent.
11. The impact of differences in the degree of risk exposure can best be demonstrated through a numerical example. Note that this example is built on a set of assumption that may not be representative for a single individual. If we assume a person has 30 years to retirement and currently earns $50,000 p.a., we can compute the expected wealth at retirement under the following assumptions: KiwiSaver contribution 6 per cent; Inflation rate 4 per cent; risk-free rate 5.75 per cent; Market Risk Premium 5 per cent (Note: these numbers are based on the long-run statistics reported in Frijns and Tourani-Rad, 2014). We further assume that an investor invests in a "growth" fund and does not switch to another fund. Based on these assumptions, the expected wealth at retirement of this investor for a fund with a beta of 0.5 (lower end of the observed range) would expect to end up with approximately $585,000, whereas an investor with a beta of 1.0 (higher end of the observed range) would end up with approximately $900,000.

References

Banz, R. (1981), "The relationship between return and market value of common stocks", *Journal of Financial Economics*, Vol. 9 No. 1, pp. 3-18.

Bauer, R., Otten, R. and Tourani-Rad, A. (2006), "New Zealand mutual funds: measuring performance and persistence in performance", *Accounting and Finance*, Vol. 46 No. 3, pp. 347-363.

Carhart, M. (1997), "On the persistence in mutual fund performance", *Journal of Finance*, Vol. 52 No. 1, pp. 57-82.

Chen, J., Hong, H., Huang, M. and Kubik, J. (2004), "Does fund size erode mutual fund performance? The role of liquidity and organization", *American Economic Review*, Vol. 94 No. 5, pp. 1276-1302.

Del Guerico, D. and Tkac, P. (2002), "The determinants of the flow of funds of managed portfolios: mutual funds vs pension funds", *Journal of Financial and Quantitative Analysis*, Vol. 37 No. 4, pp. 523-557.

Fama, E. and French, K. (1992), "The cross-section of expected stock returns", *Journal of Finance*, Vol. 47 No. 2, pp. 427-465.

Fama, E. and French, K. (1993), "Common risk factors in the returns on stocks and bonds", *Journal of Financial Economics*, Vol. 33 No. 1, pp. 3-56.

Fama, E. and French, K. (2008), "Mutual fund performance", Working Paper.

Frijns, B. and Tourani-Rad, A. (2014), "The long-run performance of the New Zealand stock markets: 1899-2013", Working Paper.

Gil-Bazo, J. and Ruiz-Verdu, P. (2009), "The relation between price and performance in the mutual fund industry", *Journal of Finance*, Vol. 64 No. 5, pp. 2153-2183.

Hendricks, D., Patel, J. and Zekhauser, R. (1993), "Hot hands in mutual funds: short-run persistence of relative performance, 1974-1988", *Journal of Finance*, Vol. 48 No. 1, pp. 93-130.

Kritzer, B. (2007), "KiwiSaver: New Zealand's new subsidized retirement saving plan", *Social Security Bulletin*, Vol. 67 No. 4, pp. 113-119.

Le, T., Scobie, G. and Gibson, J. (2009), "Are Kiwis saving enough for retirement? Evidence from SOFIE", *New Zealand Economic Papers*, Vol. 43 No. 1, pp. 3-19.

MacDonald, K., Bianchi, R. and Drew, M. (2012), "KiwiSaver and retirement adequacy", *Australian Accounting Business and Finance Journal*, Vol. 6 No. 4, pp. 61-78.

Malkiel, G. (1995), "Returns from investing in equity mutual funds 1971 to 1991", *Journal of Finance*, Vol. 50 No. 2, pp. 549-572.

Rosenberg, B., Reid, K. and Lanstein, R. (1985), "Persuasive evidence of market inefficiency", *Journal of Portfolio Management*, Vol. 11 No. 3, pp. 9-17.

Scobie, G. and Henderson, K. (2009), "Household debt in New Zealand", Working Paper Series, The Treasury, available at: www.treasury.govt.nz/publications/research-policy/wp/2009/09-03

Statman, D. (1980), "Book values and stock returns", *The Chicago MBA: A Journal of Selected Papers*, Vol. 4 No. 1, pp. 25-45.

Thomas, C. and Matthews, C. (2014), "KiwiSaver member behaviour: a quantitative analysis", *Pacific Accounting Review*, Vol. 26 No. 3, pp. 248-273.

Zhang, A. (2014), "Financial advice and asset allocation choices of individual investors: evidence from New Zealand", *Pacific Accounting Review*, Vol. 26, pp. 226-247.

Zheng, L. (1999), "Is money smart? A study of mutual fund investors' fund selection ability", *Journal of Finance*, Vol. 54 No. 3, pp. 901-933.

Further reading

Sharpe, W. (1964), "Capital asset prices: a theory of market equilibrium under conditions of risk", *Journal of Finance*, Vol. 19 No. 3, pp. 425-442.

Swinkels, L. and Tjong-a-Tjoe, L. (2007), "Can mutual funds time investment styles?", *Journal of Asset Management*, Vol. 8 No. 1, pp. 123-132.

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