The Irish Unit Fund Industry: Structure and Performance*

MARTIN KENNEALLY
LIAM GALLAGHER
University College Cork

Abstract: An outline of the size, structure, functioning and price history of the Unit Fund Industry in Ireland is sketched for the period 1983-1990. Some traditional performance measures are motivated and augmented by more recent measures which attempt to identify overall fund performance and decompose its selection, diversification and timing components. An empirical appraisal of the performance of the 16 funds extant over the sample period is conducted and absolute and comparative rankings are established. The results are not supportive of superior performance ability by Irish Unit Fund managers.

I INTRODUCTION

A s a convenient and popular investment medium, unit funds, over the past decade, have proven to be highly successful in attracting investors. The putative benefits to investors in unit funds are those commonly claimed for financial intermediation; economies of scale in transactions' costs, information, expertise and administration. If correct, these claims imply that improved return/risk opportunities result from enhanced management skills, in particular, selection, diversification and timing skills which enhance the gross asset value of the portfolio. The investor also faces costs. There is currently a government levy of 3 per cent which is deducted from the unit

investors' subscription. Companies may also make an additional deduction in respect of insurance cover depending on the nature of the policy. The remaining proportion of the subscription is divided by the offer price per unit to obtain the investors unit allocation. Neither of the two costs mentioned therefore is reflected in the offer price of the fund. A recurrent management fee of between 0.5 per cent and 1 per cent (generally 0.75 per cent) is charged and does add to the liabilities of the fund. The net asset value of the fund is the gross value of the underlying portfolio netted for such liabilities. Unit valuations are continually provided by the fund on this basis. When the investor exits from the fund he sells his units to the fund at the bid price prevailing on the day. There is generally a 5 per cent offer/bid spread which reduces the return to the investor. Thus a five-year unit investor will, between levies, management charges and bid/offer spreads, lose around 1.5 per cent to 2 per cent per annum if the gross asset value per unit remained static over the holding period. Management charges vary over time and across funds but lie in the range indicated. Funds with direct sales forces will tend to have higher charges.

Notwithstanding its size, growth and performance claims, the Irish Unit Fund industry has been a surprisingly neglected Cinderella amongst Irish academic researchers. The purpose of this article is to take some initial steps to reverse this neglect. In Section II we sketch some salient features of the unit fund industry. Section III draws on finance theory and the CAPM to motivate some traditional single parameter performance measures. Additionally, some issues of selection, diversification and timing are considered which are captured by some more refined measures of more recent origin. Section IV ranks the performance of funds on the selected measures, interprets the results and examines the effects of periodicity, and the effects of the October '87 crash. Section V concludes the study.

II THE UNIT FUND INDUSTRY

Unit funds are operated by a large number of companies, principally banks, insurance and some joint management groups and are referred to collectively as open-ended investment companies. Participating members purchase units from the company with funds which are combined into a single investment portfolio. (A company generally operates a number of such unit funds.) The unit allocation does not entitle the holder to ownership of particular assets but does entitle the holder to encash their units thereafter at the net asset value per unit on the day. The net asset value per unit is the funds' total assets less liabilities divided by the number of units.

The unit fund industry grew rapidly in Ireland. The number of funds

increased from 111 in October 1987 to 204 in October 1990. There are currently around 250 funds in operation. The managing companies, fund sectors and types are set out in Table 1.

Table 1: *Classification of Irish Unit Funds*

| Investment Company	Fund
	Cash
1. Abbey Life	1. Cash
2. AIB Investment Managers Ltd.	2. Guaranteed
3. Canada Life	3. Cautiously Managed
4. Combined Assurance	*Gilt*
5. Cork & Limerick Saving Bank	4. Fixed Interest
6. Eagle Star	*Managed*
7. Friends Provident	5. Managed Growth
8. GRE Life	6. Aggressively Managed
9. Hibernian Life	*Equity*
10. IBI Lifetime	7. Irish Equity
11. ICC Fund Management Ltd.	8. General Equity
12. Irish Life	9. International
13. National Mutual	10. European Equity
14. New Ireland	11. American Equity
15. Norwich Union	12. UK Equity
16. NZI Life	13. Far Eastern Equity
17. Prudential	*Property*
18. Royal Life	14. Property
19. SBC Investment Services	
20. Standard Life	
21. Sun Life of Canada	

Source: Micropal.

Figure 1 highlights the proportionate importance by number and value of the fund sectors. It is evident that equity and managed funds dominate the remaining sectors — cash, guaranteed, fixed interest and property.

Table 2 provides a size classification of funds and confirms as one would expect that longer lived funds are relatively larger in size.

Hereafter we narrow our focus to the managed fund sector whose assets stood at £2.83bn on 29/9/90. Around 80 per cent of the funds under management were placed with Life Companies; Irish Life dominated this group with a total market share of around 40 per cent. Banks and joint operations account for the remaining 20 per cent market share. The share of non-life companies, while small, has grown rapidly with Investment Bank of Ireland dominating the newer entrants. The relatively weak presence of Allied Irish Banks (AIB) at 28/9/90 is notable. Given the sizeable market

Figure 1: *Unit Fund Classification (% of Total Funds — 28/9/1990)*
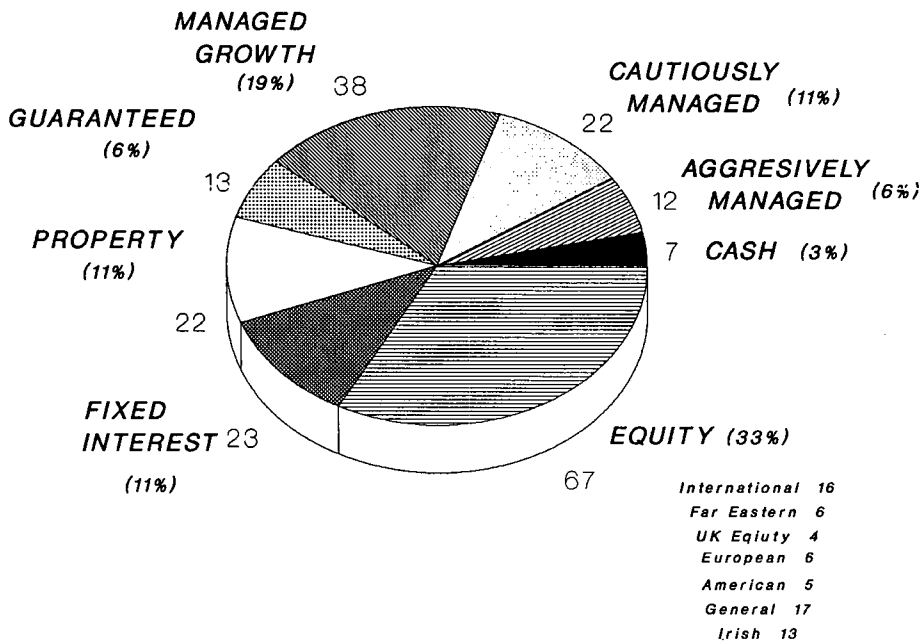
Note: The bracketed numbers are the percentages of the total number of funds.
           The unbracketed numbers are the total number of funds in each sector.

Table 2: *Unit Funds by Fund Size: Managed Funds**

Size £m	Number		Per Cent	
100 and over	7	(7)	18.9	(24.1)
50 and under 100	4	(4)	10.9	(13.8)
25 and under 50	10	(8)	27.0	(27.6)
10 and under 25	10	(7)	27.0	(24.1)
5 and under 10	3	(2)	8.1	(6.9)
1 and under 5	2	(1)	5.4	(3.5)
under 1	1	(0)	2.7	(0.0)
Total	37	(29)	100.0	(100.0)

Sources: Derived from NCB's data, 28/09/90.
           *For list of funds in study see Table 4. Bracketed figures are for funds that
           were in operation before 1st October 1987.

Table 3: *Annual Rates of Return of Managed Funds (%)*

Managed Funds	1984	1985	1986	1987	1988	1989
Abbey Life Growth Managed (1)	4	27	7	6	18	10
Eagle Star Investment (Blue)	4	24	15	9	21	8
Hibernian Life Managed	3	21	13	5	16	11
IBI/Canada Life Managed	3	21	12	11	19	13
Irish Life Managed (1)	0	17	14	4	20	17
Irish Life Managed (2)	1	17	14	4	19	17
Irish Life Managed (3)	1	17	14	4	19	17
New Ireland Evergreen (1)	7	11	12	8	19	18
New Ireland Evergreen (2)	6	11	11	7	19	17
New Ireland Evergreen (3)	6	11	12	7	19	17
New Ireland Managed (1)	3	21	13	13	20	12
Norwich Union Managed (1)	7	16	17	1	22	21
Norwich Union Managed (2)	6	17	17	1	22	21
Prudential Life Grobond Managed	1	17	17	9	20	11
Standard Life Managed	1	23	13	11	24	13
Sun Life of Canada Managed	2	30	8	12	22	17
Friends Provident Mixed	na	22	13	11	19	10
Irish Life Active Managed (4)	na	na	22	13	21	11
Irish Life Venture Managed (4)	na	na	27	9	20	15
AIB Investment Managers AIIP	na	na	na	8	18	10
National Mutual Managed	na	na	na	0	15	13
New Ireland Managed (2)	na	na	na	13	22	11
Prudential Life Balanced (1)	na	na	na	9	20	10
Prudential Life Opportunity (1)	na	na	na	3	17	11
Abbey Life Hi Growth Managed (1)	na	na	na	na	20	10
Hibernian Life Hi-Growth	na	na	na	na	14	11
IBI/Lifetime Managed Growth	na	na	na	na	23	11
IBI/Lifetime Managed Opportunity	na	na	na	na	31	22
Irish Life Active Managed (5)	na	na	na	na	20	10
Irish Life Venture Managed (5)	na	na	na	na	19	14
Royal Life Managed	na	na	na	na	26	12
Combined Assurance Managed Acc.	na	na	na	na	na	10
Cork & Limerick SB Capital Plus	na	na	na	na	na	13
Eagle Star Balanced (Blue)	na	na	na	na	na	9
Eagle Star Performance (Yellow)	na	na	na	na	na	14
Eagle Star Adventurous (Red)	na	na	na	na	na	21
GRE Life Managed	na	na	na	na	na	na
SBC Managed	na	na	na	na	na	na
AVERAGE PERFORMANCE	3	19	14	8	20	14
ISEQ INDEX	−10	47	47	−8	37	36

Sources: Derived from offer prices, thus excluding dealing cost on managed funds, using NCB's data. The Irish Stock Exchange Quoted (ISEQ) index is derived from Datastream. The time period of a year is from 1st January to 31st December.

Notes: Bracketed figures are the numbers of specific funds associated with investment companies with more than one fund of the same type and returns are the associated returns on each of these funds. The (annual) average performance is an arithmetic (simple) average of the funds in operation for that year. na indicates unavailable annual returns for funds not operating for that (full) year.

presence of AIB in Irish financial markets and sizable economies of scope in managing the bank/client relationship it seems likely that the market share of the traditional insurance companies will come under vigorous attack in the near future.

When compared with the value of Money and other Liquid Assets (£19bn), the Irish Stock Exchange (£6.9bn) and Government Securities (£12.3bn) at the same date it is evident that the sector is large both absolutely and relatively. Fee income and commission figures are not readily available but are likely to lie in the £28mn to £56mn range. The true figure is undoubtedly large and is defended on the basis of claims to superior information, expertise and performance by the managing companies. Table 3 documents the annual gross returns (i.e. the annualised compound growth rate) of each fund's offer price over a six year period, 1984/89, and also sets out the (unweighted) performance of funds and the growth rate of the official index for the Irish Stock Exchange, the ISEQ Index, over the same period.

Note especially that the growth in a fund's offer price reflects the growth in the gross asset value less the recurrent management charge (around 0.75 per cent per annum) per unit. It takes no account of levies, insurance cover deductions or offer/bid spreads. Note also that while funds may pay income tax in respect of dividends and coupon income received on the underlying portfolio such tax is necessarily less than the income received. Therefore a comparison with a pure capital index, such as the ISEQ index may not be faulted as being inherently unfavourable to funds on the basis of their income tax liabilities.[1] Unit fund prices are, however, unlike the ISEQ index, reduced by their liability to Capital Gains Tax.[2]

The data show that the ISEQ (Irish Stock Exchange Quoted) index had a more volatile performance over the period and also that sizeable deviations from average fund performance have occurred. It is evident that individual fund's average returns have to be judged against the risk or return volatility to which the investor is exposed and, further, that a judgement on these data is influenced by the sample period chosen. Table 4 provides a finer fix on the data.

It confirms that the higher average return on ISEQ is matched by higher volatility for the Index than for any of the funds. Surprisingly, an equally weighted index yields a superior return and at lower risk than many indi-

1.   The annual dividend yield for the ISEQ is not readily available. The annual dividend yield for the Goodbody Irish Equity index, whose coverage is nearly coincident, ranges between 2.5 per cent and 7.6 per cent over the sample period and takes an average value of just over 4 per cent.

2.   Some aspects of the operational distinction between unit trusts and investment trusts and their treatment under Irish tax law may be found in Hunt (1988), McLoughlin (1990) and O'Dwyer (1990). The complex nature of Capital Gains Tax rules prevents a rescaling of the ISEQ index for comparative purposes.

Table 4: *Weekly Performance of Managed Funds (30/9/1983-28/9/1990)*

Managed Fund	Fund Size (£m)	Average Return (%)	Standard Deviation	Variance	Minimum (weekly)	Maximum (weekly)	Periods of Data (weeks)
Abbey Life Growth Man.	53.1500	0.172545	1.442686	2.081342	−8.152773	9.001343	365
Canada Life/IBI Man	132.9600	0.180022	1.206994	1.456835	−8.983213	4.354450	365
Eagle Star Inv. (Blue)	46.5600	0.195017	1.162179	1.350659	−10.566229	3.511905	365
Hibernian Life Man	34.8250	0.147415	1.284397	1.649675	−12.181880	3.064167	365
Irish Life Man (1)	346.9000	0.160174	1.322217	1.748257	−13.056317	3.985073	365
Irish Life Man (2)	84.4000	0.155460	1.322684	1.749494	−13.087607	3.985140	365
Irish Life Man (3)	162.1000	0.157111	1.310513	1.717444	−12.950420	3.930280	365
New Ireland Evg (1)	11.2100	0.194850	1.066859	1.138188	−10.623113	4.281768	365
New Ireland Evg (2)	12.6400	0.181645	1.066844	1.138155	−10.798751	4.284919	365
New Ireland Evg (3)	7.2400	0.181703	1.071262	1.147602	−10.861218	4.243669	365
New Ireland Man (1)	11.0300	0.204591	1.218181	1.483965	−5.653207	10.215736	365
Norwich Union Man (1)	} 46.0700	0.221904	1.789758	3.203234	−18.319438	8.048666	365
Norwich Union Man (2)		0.224310	1.784874	3.185774	−18.304432	8.011504	365
Prudential Grobd Man	65.1000	0.159635	1.095824	1.200830	−8.116465	4.169769	365
Standard Life Man.	359.9000	0.191308	1.311415	1.719810	−9.006410	5.339806	365
Sun Lf of Canada Man	21.1600	0.218251	1.262531	1.593984	−7.424197	3.687397	365
Friend Provident Mxd	47.9340	0.162912	1.420726	2.018463	−8.798283	6.002144	342
Irish Lf Active Man (4)	103.5000	0.252586	1.468327	2.155984	−10.164108	3.922830	260
Irish Life Ven. Man (4)	40.1000	0.278108	1.778944	3.164641	−13.299351	5.995056	260
New Ireland Man (2)	15.5500	0.141824	1.025821	1.052309	−5.653207	4.471772	226
National Mutual Man	3.9100	0.112891	1.189108	1.413977	−5.730249	3.830200	221
AIB Invest Mgers AIIP	71.6000	0.120503	1.339359	1.793882	−9.343629	5.807623	209
Prudential Lf Bal (1)	38.8000	0.138818	1.315887	1.731558	−9.037472	3.808752	209
Prudential Opp (1)	13.5000	0.077981	1.501846	2.255510	−9.901738	4.170616	209
Royal Life Managed	17.4200	0.057611	1.623528	2.635844	−11.566265	5.061224	185
Abbey Lf Hi-Gro M (1)	8.3500	0.023042	1.597670	2.552549	−12.559467	4.265873	162
IBI/Lftime Man. Gro	234.3200	0.117939	1.284932	1.651049	−6.844106	6.033630	160
IBI/Lftime Opport.	27.9800	0.144622	1.806649	3.263980	−8.131868	7.988166	160
Irish Lf Active Man (5)	201.8000	0.003179	1.458324	2.126709	−10.117878	3.937947	156
Irish Lf Vent. Man (5)	43.9000	−0.037587	1.858782	3.455071	−13.268293	5.989583	156
Hibernian Lf Hi-Growth	16.6160	0.032257	1.419479	2.014921	−10.344828	3.400000	153
Combined Assurance Acc	0.7964	−0.013469	1.034233	1.069638	−4.435146	2.772809	116
Eagle Star Bal (Blue)	29.0200	−0.000983	1.022843	1.046209	−3.671329	2.248201	112
Eagle Star Per (Yellow)	33.1100	0.024794	1.121111	1.256889	−4.688909	2.837489	112
Eagle Star Adven (Red)	10.6200	0.017507	1.325024	1.755688	−5.589520	2.945736	112
Cork & Lmrk SB Cap+	17.4500	−0.006383	1.259420	1.586140	−4.983108	3.373016	105
SBC Managed	4.4000	−0.264868	1.741777	3.033787	−7.940420	5.448816	62
GRE Life Managed	6.7000	−0.208954	1.428423	2.040393	−5.888325	3.422053	49
AVERAGE PERFORMANCE	64.3952	0.108430	1.361617	1.911591	−9.474820	4.785503	365
WEIGHTED PORTFOLIO		0.187470	0.909757	0.827659	−7.186196	2.449653	365
ISEQ INDEX		0.280179	2.849585	8.120136	−17.951691	7.673000	365

Sources: Derived from weekly offer prices using NCB's data, and the ISEQ index from Datastream. Time period is from 30/09/83-28/09/90.

Notes: (1) Norwich Union managed funds (1) and (2) have joined together to become one individual unit fund called Norwich Union (1 & 2).

(ii) The Weighted Portfolio is an equally weighted portfolio consisting of all the 37 managed funds under study.

vidual funds, suggesting that the scope for efficient risk reduction is not being exploited by many funds. Note, however, that extreme care is required in interpreting the data due to the different periods of data under review for some companies. For example, it is tempting to conclude that the ISEQ outperformed Irish Life Venture Managed 4 which in turn outperformed SBC managed. The ISEQ, however, has higher volatility than Irish Life. The latter

fund, in turn, was in operation since 1985 thereby benefiting from the intervening bull markets whereas SBC's commencement in July 1989 coincided with a downturn in the market and recorded negative growth (see Figure 2).

Figure 2: *Performance of Irish Unit Funds (Using Weekly Data)*
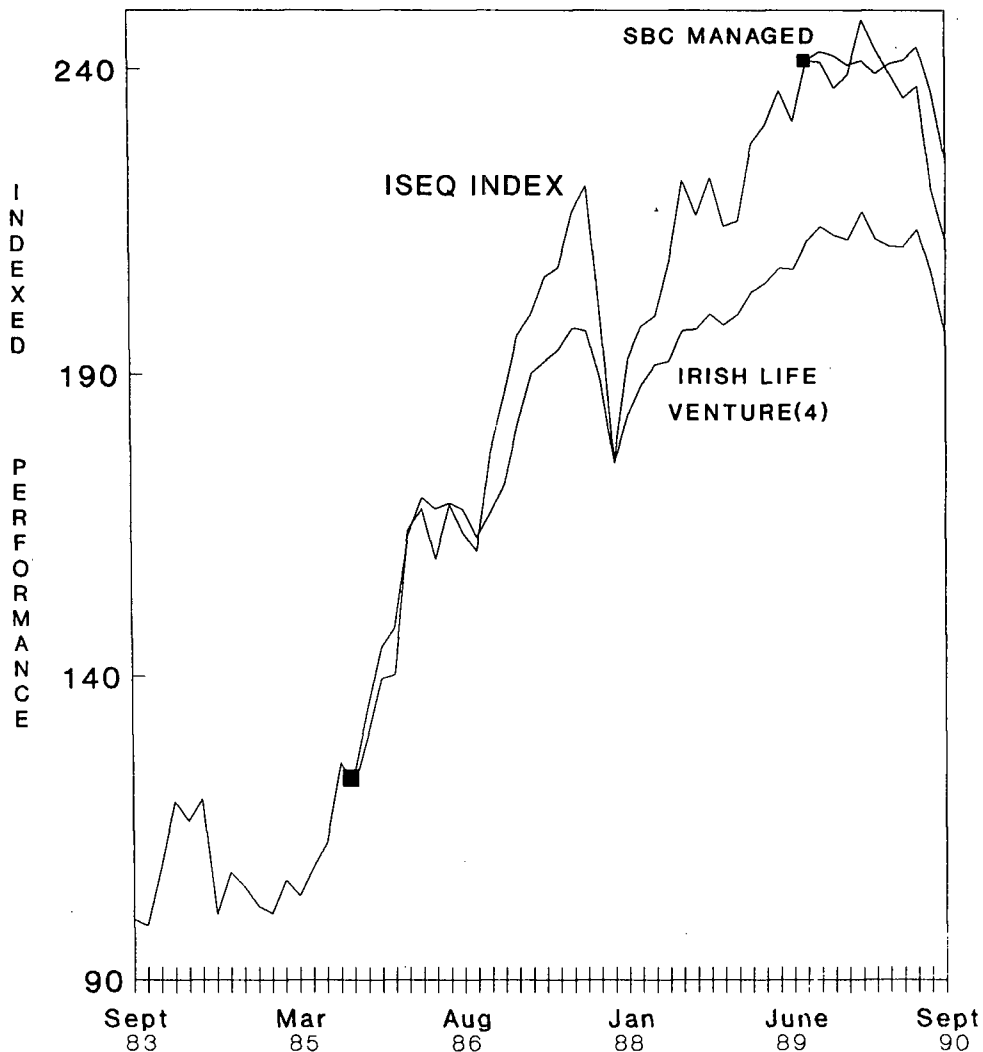
Source: NCB data (offer prices).

For these reasons we restrict our attention to the 16 funds in operation from January 1984 through to September 1990. Moreover, we scale our return data to the level of risk exposure in order to enhance comparability. The appropriate choice of risk measure is taken up in the next section.

III PERFORMANCE MEASURES

Given a unified sample period for all funds under consideration what risk adjustment procedure should be pursued in order to facilitate comparisons of performance? The Capital Asset Pricing Model (CAPM) is the most widely used workhorse model for this purpose and is adopted hereafter in this study. It is true, however, that the choice of model, and also the specification of the model, may, in some measure, influence the risk-adjusted performance ratings of funds. For example, Lehmann and Modest (1987) compared a number of models (i.e. the CAPM and multi-factor Arbitrage Pricing Theory models (APT)) and find that model selection affects the empirical rankings of (i) under and over-performing funds and (ii) the relative rankings of funds. These considerations circumscribe the generality and robustness which may be claimed *a priori* for CAPM based calculations. None the less, given the above caveats, the CAPM yields some important widely adopted baseline performance measures which are motivated beneath. They facilitate comparative assessment and establish a reference point for further research.

The CAPM, characterised by a regression of the returns on the portfolio under scrutiny against the excess returns on a market index, yields the following expression,

$$E(R_p) = R_f + \left[\frac{E(R_m) - R_f}{\sigma_m^2} \right] \sigma_p \sigma_m \rho_{pm} \tag{1}$$

where

$E(R_p)$	is the expected return on portfolio p.
R_f	is the risk free interest rate associated with a zero beta portfolio.
σ_p	is the standard deviation of the return on portfolio p.
$E(R_m)$	is the expected return on a market index.
σ_m	is the standard deviation of the return on the market index.
ρ_{pm}	is the correlation coefficient of the returns on portfolio p and the market index.

R_f may be interpreted as the price of time and the bracketed term as the market price of risk. Hence the total return on portfolio p is a risk free rate plus a risk premium consisting of a fixed premium per unit of risk exposure times the number of such units. The equation simplifies to the security market line,[3]

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3. If security prices are determined by a restricted CAPM (e.g. no short sales and/or borrowing at the risk-free rate).

$$E(R_p) = R_f + [E(R_m) - R_f]\beta_p \qquad (2)$$

where β_p is the slope coefficient of a bivariate regression of the security return on the market index. If the asset set is restricted to efficient portfolios ($\rho_{pm} = 1$) then Equation 1 becomes,

$$E(R_p) = R_f + \left[\frac{E(R_m) - R_f}{\sigma_m} \right] \sigma_p \qquad (3)$$

Rearranging Equations 2 and 3 yields the Treynor and Sharpe Indexes, respectively.

$$\frac{E(R_p) - R_f}{\beta_p} = I_T \qquad (2')$$

$$\frac{E(R_p) - R_f}{\sigma_p} = I_S \qquad (3')$$

Restating Equation 2 in *ex post* estimating form yields,

$$R_p - R_f = \alpha_p + \beta(R_m - R_f) + u_p \qquad (2'')$$

The regression parameter α_p, Jensen's alpha, provides a third measure of risk-adjusted performance.

The Treynor Index scales return by the amount of systematic risk and is a relevant measure for an investor with multiple portfolios who can diversify away the remaining unsystematic risk. The Sharp Index is the relevant measure for an investor with a single portfolio. Both measures provide for a relative ranking of performance of competing portfolios ($p = 1,...,N$). The rankings will coincide if the portfolios under review are fully diversified. Jensen's alpha draws on the CAPM and provides a measure of selection ability since it measures the average deviation from the SML. It has the additional advantage of a simple test statistic (the t-test for a regression intercept). The coefficient of determination provides an index of Diversification. If the portfolio returns lie exactly on the SML then they are perfectly correlated with R_m and $R^2 = 1$.

The inter-relationship between the various measures are illustrated in Figure 3 which is based on the Fama 1972 decomposition,

Figure 3: *The Components of Performance*

Return

$$R_p = R_f + \beta_p(R_m - R_f)$$
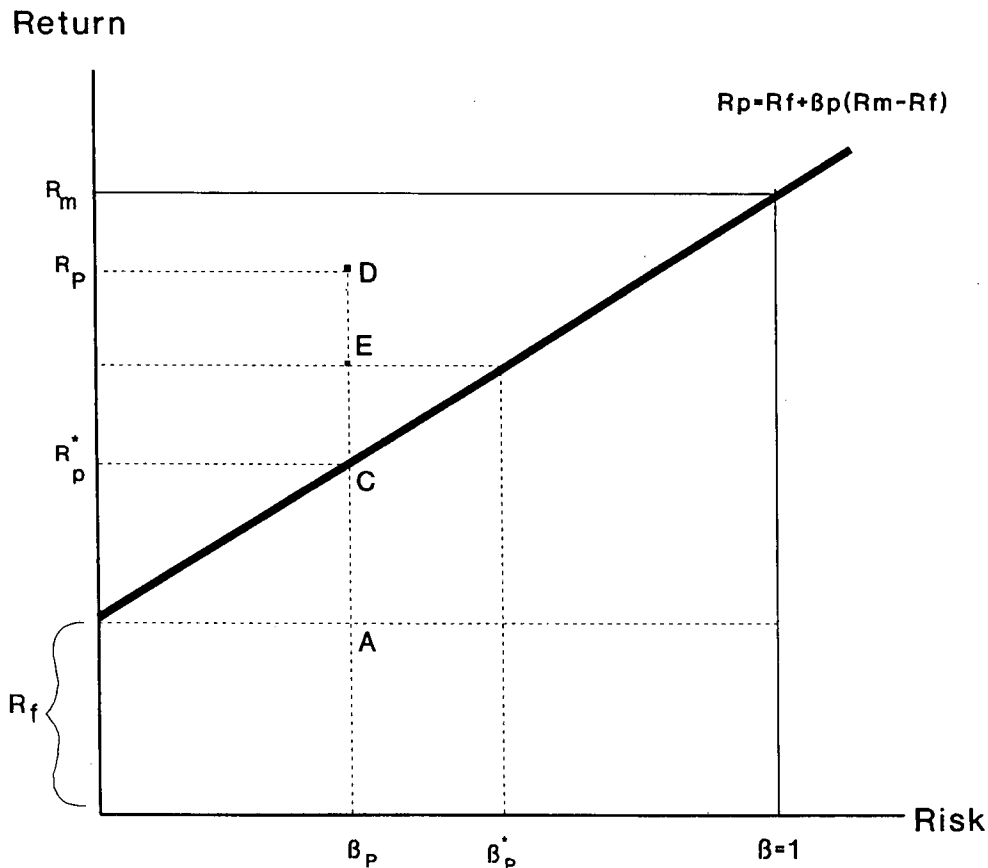
$(R_m - R_f)$ is the risk premium per unit of systematic risk ($\beta=1$). If the portfolio β is β_p then the risk premium is AC which when added to the risk-free rate yields a total return, β_pC. The distance CD measures Jensen's alpha (the vertical distance from the SML). If the portfolio is not fully diversified then the underlying risk exceeds β_p, say it is β^*_p. This would typically occur when an aggressive fund manager overweights an "under-priced" stock and incurs some diversifiable risk. In such cases the gross Selectivity return (=CD) includes a component CE which is attributable to the Diversification risk incurred; DE is, accordingly, termed Net Selectivity.

The measures thus far reviewed deal with two components of managerial performance appraisal. Selectivity deals with the capacity to select under-priced stocks and diversification deals with the capacity to diversify the portfolio such that it is mean-variance efficient. A third component of

performance is Timing. This relates to the capacity to successfully anticipate movements in the market index. A successful Timer moves into high beta stocks before the onset of a bull market and into low beta stocks before the onset of bear markets. Grinblatt and Titman (G&T) show that such timing capacity systematically biases the estimated value of alpha such that it can no longer be considered a measure of selectivity. Hence the Jensen measure needs to be modified for timing ability in order to yield a clean measure of selectivity.

Using asterisks (*) to signify excess returns (i.e. returns less the risk-free rate) we can write the (small sample) estimator of alpha as,

$$\alpha = \overline{R}_p^* - \beta_p \overline{R}_m^* = \sum_{t=1}^{T} w_t R_{pt}^* \qquad (4)$$

The bars signify sample means and the equation shows that α is a weighted average of the period by period portfolio excess returns. G&T call this a period weighting measure. They further demonstrate that the conventional utility maximising considerations imply that the weights, w_t, should be positive and that the presence of negative weights imparts downward bias to the Jensen estimator. The authors outline a procedure for adjusting the set of weights, w_t, should negative weights be observed in the first pass estimates such that all the adjusted weights, w_t^*, are positive. The revised measure,

$$\alpha^* = \Sigma w_t^* R_{pt}^* \qquad\qquad w_t^* > 0 \qquad (5)$$

is the Positive Period Weighting, PPW, measure used by G&T in order to mitigate the downward bias positive timing ability imparts to the Jensen measure. However, inspection of the period by period weights of all the Jensen estimates reported in this study shows them to be positive so that the Jensen and PPW estimates coincide and are reported in the same column in each of the relevant Tables. This result is not supportive of positive market timing by Irish fund managers. Jagannathan and Korajczyk (1986) identify a bias in conventional timing measures. Funds which invest in stocks with little or no risky debt or option-like securities will tend to *artificially* engender negative timing. They further show that the bias in the timing measure is negatively correlated with measured selection ability. In short, while our performance measures may understate the timing ability of such funds they overstate their selection ability.

A fifth measure, the General Performance Measure (GPM), is a modified version of the Moses, Cheyney & Veit performance measure and may be useful in gauging the effects on performance of aggressive portfolio managers who maintain inadequate diversification.

Systematic portfolio risk is,

$$\beta_p = \frac{\sigma_p \bullet \sigma_m \bullet \rho_{pm}}{\sigma_m^2} \tag{6}$$

Systematic risk on an efficient portfolio (i.e. $\rho_{pm} = 1$) is,

$$\beta_p = \frac{\sigma_p}{\sigma_m} = I_p = \text{Index of Total Portfolio Risk.} \tag{7}$$

For an inefficient portfolio,

$$\beta_p < I_p$$

Thus lack of Diversification is captured by the expression,

$$D = \left[\frac{\sigma_p}{\sigma_m}\right] - \beta_p = \left[\frac{\sigma_p}{\sigma_m}\right](1 - \rho_{pm}) \tag{8}$$

If $\rho_{pm} = 1$ then $D = 0$. Less than perfect Diversification implies a positive value for D. Therefore, given the PPW measure, α^*, and D the GP_p is,

$$GP_p = \frac{\alpha^*}{D} \tag{9}$$

The PPW measure measures the superior return due to Selection and Timing, and is scaled by the additional Diversification risk that may have been incurred in the process. If large and positive, the GP_p implies a superior performance relative to the additional Diversification risk incurred.

Rankings on GP_p provide a measure of relative performance. It is possible to go a step further and identify funds that "beat the market" on a risk-adjusted basis by relating GP_p to a measure of excess return per unit of systematic risk for the market portfolio,

$$GPM = \frac{GP_p}{[R_m - R_f]/\beta_m} = \frac{GP_p}{[R_m - R_f]} \tag{10}$$

since $\beta_m \equiv 1$.

Figure 3 provides a graphical representation of GP_p. The distance $\beta_p \beta^*_p$ represents diversification risk D. This is divided into CD (i.e. Jensen's alpha) to yield the GP_p measure. If the diversification risk, D, were compensated in

line with market risk premia it would yield a return CE. The GPM is the ratio CD/CE in Figure 3. When the Gross Selectivity return, CD, exceeds the return due to Diversification risk the ratio exceeds 1 and the portfolio "beats the market".

IV EVIDENCE ON THE PERFORMANCE OF IRISH MANAGED FUNDS

We use weekly and monthly data for 16 funds and an equally weighted portfolio of these over the period 7/10/83 to 28/9/90. The sample period includes both bull and (two) bear markets, notably the October '87 crash. The three-month Exchequer Bill and Interbank rate are used alternatively as the risk-free rate, R_f. The ISEQ Index is used as the market rate, R_m.

Table 5 summarises the empirical evidence on the weekly performance measures. The Sharpe Index is negative for all funds whilst the excess return on the benchmark portfolio is positive. The negative Sharpe values imply that if an investor had borrowed at the risk-free rate and invested in any of the funds he would have made a loss. The Index values vary considerably from –0.0034 (Sun-Life Managed) to –0.59 (Hibernian Life Managed). Inspection of the Treynor Index yields identical conclusions.

Are these results transitory and insignificant? Jensen's α, purports to provide an answer. All of the α values are negative but insignificant at the 10 per cent, 5 per cent and 1 per cent values. (Six funds were negative and significant at the 20 per cent level.) The values vary considerably from –0.0001 (Norwich Union 2) to –0.08334 (Hibernian Life Managed).

Dybvig and Ross (1985) show that if an inefficient benchmark is used then, given a risk-free rate, any efficient portfolio (or at least efficient relative to the benchmark) will display a positive α. Thus whilst positive α's do not provide conclusive evidence of superior returns (Roll 1978 asserts that such tests are tautological) negative α's do provide evidence against superior returns. The period weights are all positive and hence the Jensen and PPW evidence coincides. Hence the negative α's are not due to positive market timing by the funds. Finally, the negative α's imply negative GPM values given the positivity of the excess return on the benchmark portfolio. As with the other ranking techniques the GPM ratio differs substantially across funds. Norwich Union (2) is once again ranked highest with a value of –0.0009 and Irish Life Managed (2) is ranked lowest with a value of –24.4082.

Fund Performance Rankings

Fund rankings on the various measures are given in Table 6. The fund rankings on the three traditional (Sharpe, Treynor and Jensen) measures are broadly similar.

Table 5: *Weekly Performance Measures (30/9/83-28/9/90)*

Managed Fund	Geometric Average	Standard Deviation	Sharpe	Treynor	Jensen	t-alpha & t-PPW	Beta (β)	R^2	PPW	GP	GPM
Abbey Managed	0.16216	1.44269	−0.03629	−0.25787	−0.05531	−0.799	0.20305	0.16130	−0.05531	−0.1824	−7.5812
Can Life/IBI Man	0.17263	1.20699	−0.03470	−0.14026	−0.05411	−1.207	0.29865	0.49787	−0.05411	−0.4332	−18.0038
Eagle Star Invest	0.18815	1.16218	−0.02269	−0.10941	−0.03534	−0.720	0.24103	0.35051	−0.03534	−0.2119	−8.8053
Hib. Life Man	0.13891	1.28440	−0.05887	−0.30592	0.08334	−1.480	0.24717	0.30120	−0.08334	−0.4094	−17.0162
Ir Lf Man (1)	0.15119	1.32222	−0.04789	−0.19314	−0.07588	−1.549	0.32788	0.50049	−0.07588	−0.5574	−23.1685
Ir Lf Man (2)	0.14647	1.32268	−0.05145	−0.20809	−0.08054	−1.639	0.32702	0.49754	−0.08054	−0.5873	−24.4082
Ir Lf Man (3)	0.14829	1.31051	−0.05054	−0.20426	−0.07870	−1.617	0.32424	0.49821	−0.07870	−0.5802	−24.1127
New Ir (1)	0.18908	1.06686	−0.02384	−0.70536	−0.02204	−0.395	0.03607	0.00925	−0.02204	−0.0652	−2.7076
New Ir (2)	0.17587	1.06684	−0.03623	−1.05635	−0.03529	−0.632	0.03659	0.00952	−0.03529	−0.1045	−4.3421
New Ir (3)	0.17588	1.07126	−0.03607	−1.06037	−0.03522	−0.628	0.03644	0.00937	−0.03522	−0.1037	−4.3118
New Ir Man (1)	0.19732	1.21818	−0.01412	−1.01450	−0.01105	−0.173	0.01696	0.00157	−0.01105	−0.0269	−1.1187
Norwich Un (1)	0.20540	1.78976	−0.00509	−0.06172	−0.00232	−0.025	0.14772	0.05535	−0.00232	−0.0048	−0.2007
Norwich Un (2)	0.20790	1.78487	−0.00371	−0.04439	−0.00001	−0.000	0.14924	0.05681	−0.00001	−0.0000	−0.0009
Pruden. Man	0.15358	1.09582	−0.05561	−0.26960	−0.06973	−1.502	0.22605	0.34631	−0.06973	−0.4399	−18.2846
Standard Lf Man	0.18260	1.31142	−0.02434	−0.09685	−0.04486	−0.934	0.32958	0.51309	−0.04486	−0.3434	−14.2728
Sun Life Man	0.21023	1.26253	−0.00340	−0.01510	−0.01494	−0.295	0.28434	0.41312	−0.01494	−0.0941	−3.9123
Weighted Port	0.18034	0.86533	−0.03950	−0.16920	−0.00044	−1.293	0.20202	0.44412	−0.00044	−0.0043	−0.1799
ISEQ INDEX	0.23858	2.84959	0.00844	0.02406	0.00000						1.0000
3-Month Interbank	0.21452	0.04098									

Notes: Since weights, w_t, associated with the PPW are all positive, the PPW measure is identical to the Jensen's alpha measure.

All the Jensen's alpha measures (and therefore the PPW measures) are insignificant at the 10 per cent, 5 per cent, and 1 per cent levels of significance.

All beta and R^2 are significant at 5 per cent and 1 per cent levels.

Sharpe and Treynor performance measures are calculated using the geometric average rate of return for funds.

The 3-month interbank rate is treated as the risk-free rate.

Table 6: *Relative Ranking of Managed Funds — Weekly Performance*

Managed Fund	Sharpe	Treynor	Geometric Mean	Jensen & PPW	GPM
Abbey Managed	11	10	11	11	8
Can Life/IBI Man	8	6	10	10	12
Eagle Star Invest	5	5	6	8	9
Hib. Life Man	16	12	16	16	11
Ir Lf Man (1)	12	7	13	13	14
Ir Lf Man (2)	14	9	15	15	16
Ir Lf Man (3)	13	8	14	14	15
New Ir (1)	6	13	5	5	4
New Ir (2)	10	15	9	7	7
New Ir (3)	9	16	8	6	6
New Ir. Man (1)	4	14	4	3	3
Norwich Un (1)	3	3	3	2	2
Norwich Un (2)	2	2	2	1	1
Pruden Man	15	11	12	12	13
Standard Lf Man	7	4	7	9	10
Sun Life Man	1	1	1	4	5

The most notable differences in rankings are that Standard Life is ranked 4th on the Treynor Index but only 7th on the Sharpe suggesting a relatively poorer diversification of that fund. Also Canada Life/IBI is ranked around 7th on the Sharpe and Treynor Index but only 12th on the GPM signifying a low return to diversification risk. This is also true for Eagle Star and Sun Life.

Table 7 provides full details of the components of return on the Fama decomposition. The Table has the following interpretation: Abbey Managed offer price underperformed the risk-free rate by 0.05236 per cent (i.e. 2.72 per cent on an annualised basis). The fund's systematic risk exposure warranted a return of 0.00489 per cent if it were to be compensated in line with market risk premia. The fund, therefore, exhibited a negative selectivity return of 0.05725 per cent (i.e. –0.05236 per cent minus 0.00489 per cent). The fund was incompletely diversified. Diversification risk exposure warranted a return of 0.00729 per cent if it were to be compensated in line with market risk premia. The net selectivity return on the fund, therefore, is –0.06454 per cent (i.e. –0.05725 per cent minus 0.00729 per cent).

The salient features of Table 7 are the uniformly negative overall returns due to negative selectivity returns. Portfolio risk premia are small both by international comparison and relative to diversification risk premia. It is notable that diversification risk premia relative to portfolio risk premia for the funds are substantially smaller for the larger funds (Canada Life/IBI, Irish Life and Standard Life) suggesting that larger funds have been more successful in diversifying portfolio risk.

Table 7: *Fama Decomposition of Return (Weekly Data)*

Managed Fund	Overall Performance 1 (=2+3)	Selectivity 2	Risk 3	Diversification 4	Net Selectivity 5 (=2-4)	D	GP	GPM
Abbey Managed	−0.05236	−0.05725	0.00489	0.00729	−0.06454	0.30323	−0.18240	−7.581167
Can Life/IBI Man	−0.04189	−0.04908	0.00719	0.00301	−0.05209	0.12492	−0.43317	−18.003758
Eagle Star Invest	−0.02637	−0.03217	0.00580	0.00401	−0.03618	0.16681	−0.21186	−8.805335
Hib. Life Man	−0.07561	−0.08156	0.00595	0.00490	−0.08645	0.20356	−0.40941	−17.016186
Ir Lf Man (1)	−0.06333	−0.07122	0.00789	0.00328	−0.07449	0.13612	−0.55743	−23.168520
Ir Lf Man (2)	−0.06805	−0.07592	0.00787	0.00330	−0.07922	0.13715	−0.58726	−24.408212
Ir Lf Man (3)	−0.06623	−0.07403	0.00780	0.00326	−0.07730	0.13565	−0.58015	−24.112696
New Ir (1)	−0.02544	−0.02631	0.00087	0.00814	−0.03445	0.33832	−0.06515	−2.707618
New Ir (2)	−0.03865	−0.03953	0.00088	0.00813	−0.04766	0.33779	−0.10447	−4.342147
New Ir (3)	−0.03864	−0.03952	0.00088	0.00817	−0.04768	0.33949	−0.10374	−4.311820
New Ir Man (1)	−0.01720	−0.01761	0.00041	0.00988	−0.02749	0.41053	−0.02692	−1.118713
Norwich Un (1)	−0.00912	−0.01267	0.00355	0.01156	−0.02423	0.48036	−0.00483	−0.200738
Norwich Un (2)	−0.00662	−0.01021	0.00359	0.01148	−0.02169	0.47712	−0.00002	−0.000871
Pruden. Man	−0.06094	−0.06638	0.00544	0.00381	−0.07019	0.15850	−0.43993	−18.284581
Standard Lf Man	−0.03192	−0.03985	0.00793	0.00279	−0.04264	0.13063	−0.34340	−14.272789
Sun Life Man	−0.00429	−0.01113	0.00684	0.00382	−0.01495	0.15872	−0.09413	−3.912301
Weighted Port	−0.03418	−0.03904	0.00486	0.00245	−0.04149	0.10165	−0.00433	−0.179911

Notes: (a) Gain on return due to diversification varies from 0.00279 (Standard Life Managed) to over 0.01156 (Norwich Union 2).

(b) Similarly the return due to risk varies from 0.00041 (New Ireland Managed 1) to over 0.00793 (Standard Life Managed).

(c) D, GP and GPM are defined in Equations (8), (9) and (10).

A plot of the rankings on the Sharpe and Treynor Indexes is given in Figure 4.

Figure 4: *Sharpe Ratio versus Treynor Index*
(based on weekly data — 7/10/83 to 28/9/90)
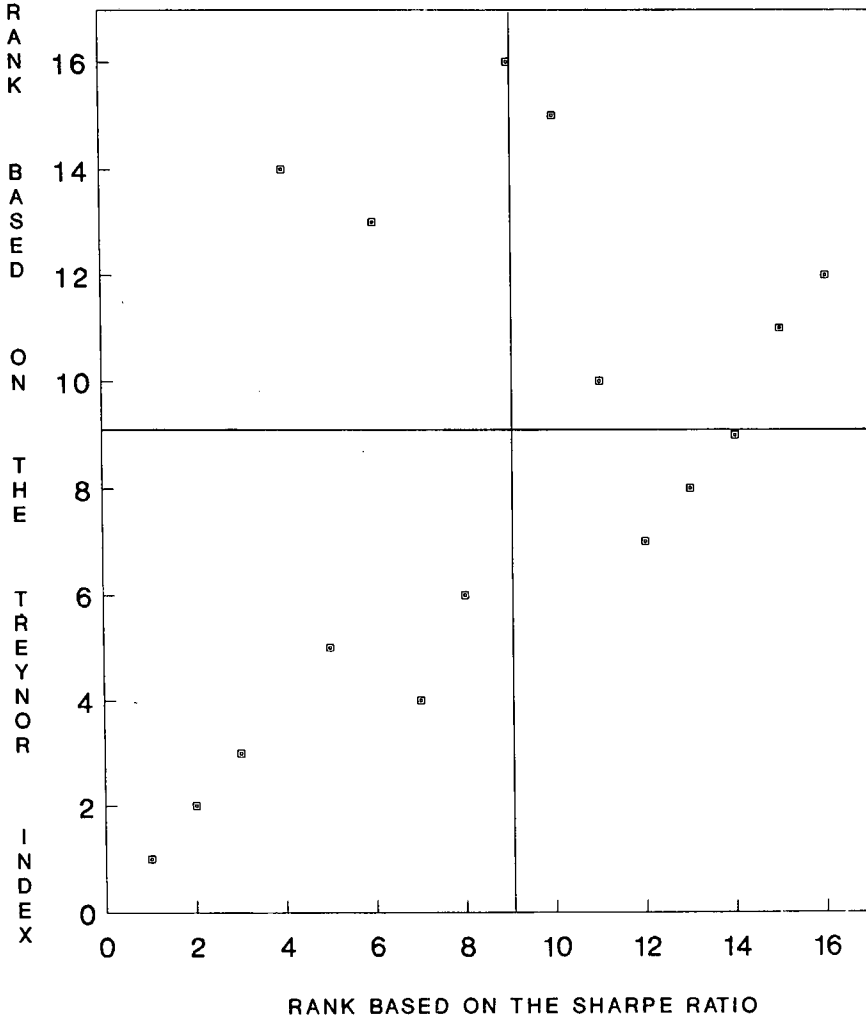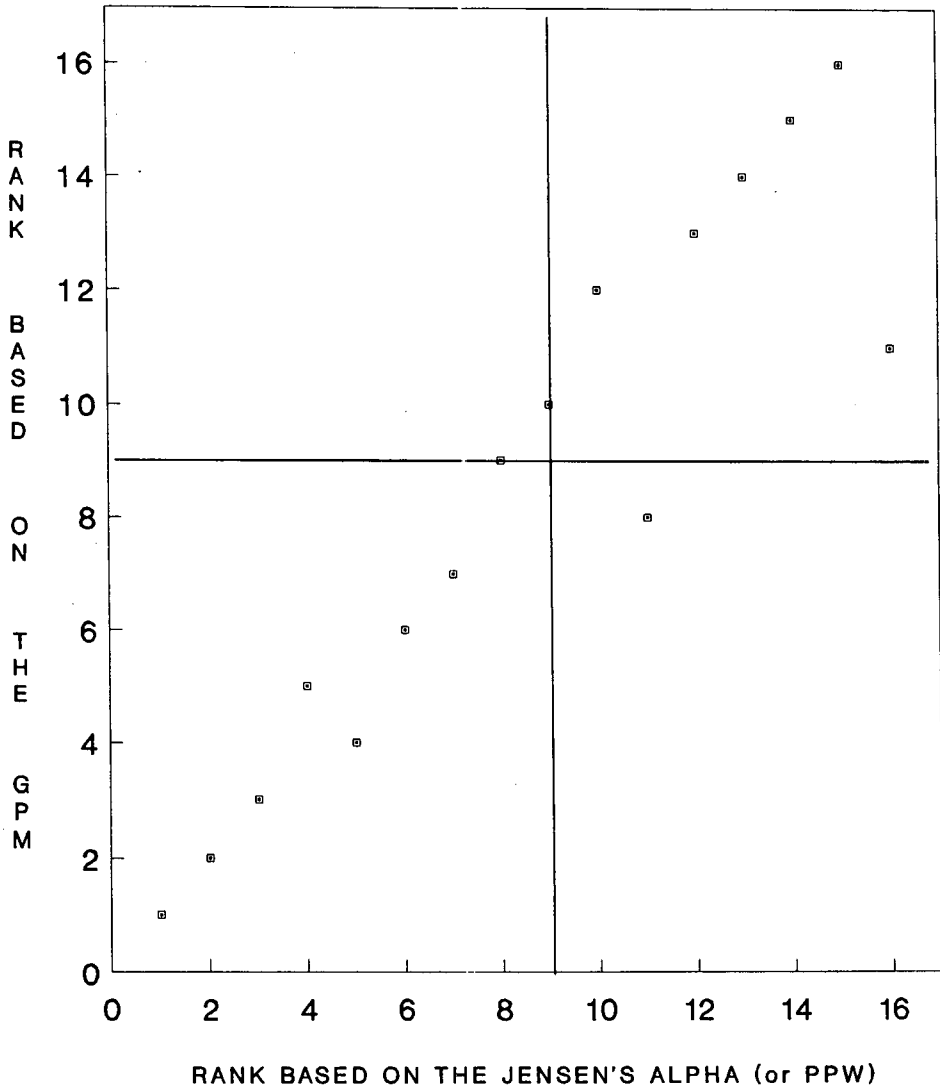

Spearman rank correlation coefficient = 0.4941

The rank correlation coefficient (0.49) is relatively low due principally to the four outliers which are all New Ireland funds with low systematic risk (i.e. low betas). Greater consistency of rankings is observed between the remaining measures, as Figures 5 and 6 show, and is further confirmed in Table 8. The Treynor measure is the exception due to the irregular rankings of the New Ireland funds.

Figure 5: *Sharpe Ratio versus GPM*
(based on weekl data — 7/10/83 to 28/9/90

RANK BASED ON THE SHARPE RATIO
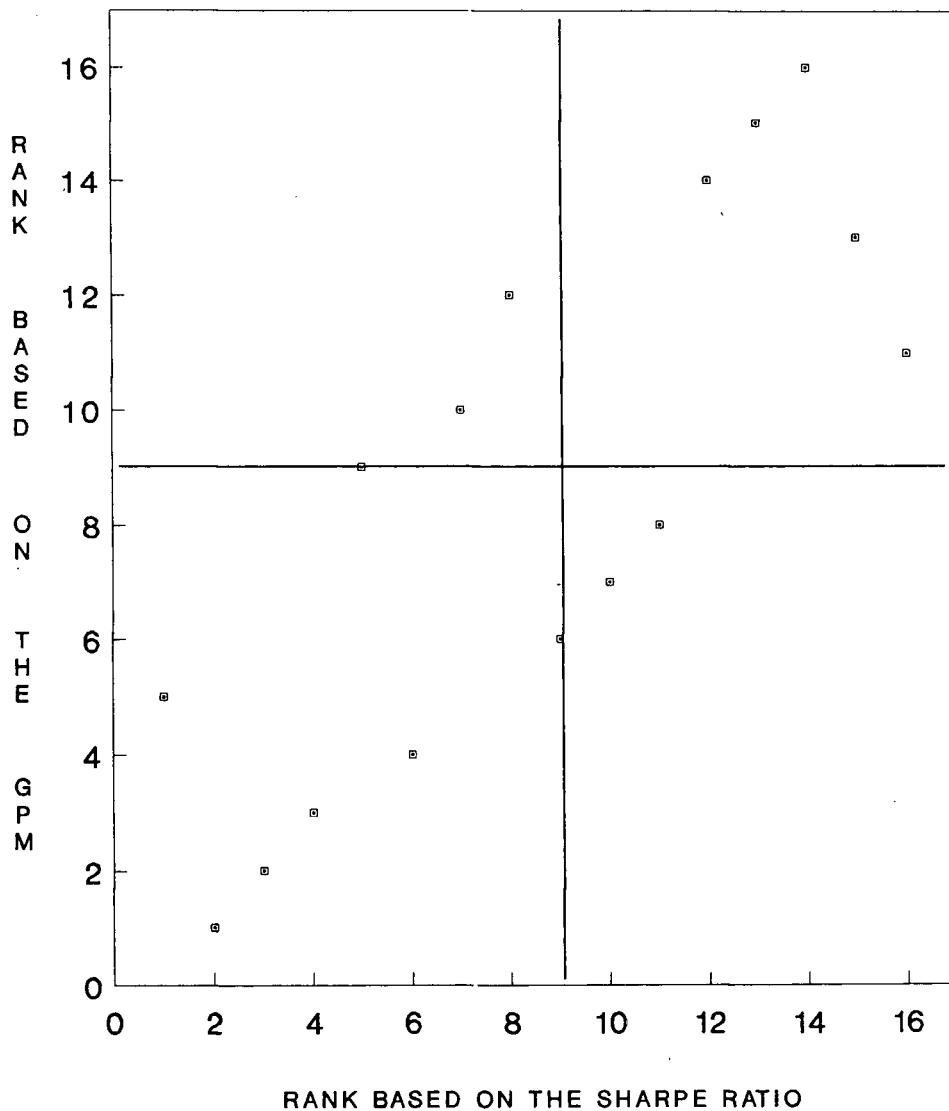
Spearman rank correlation coefficient = 0.8059.

Figure 6: *Jensen's Alpha (or PPW) versus GPM*
(baed on weekly data — 7/10/83 to 28/9/90

RANK BASED ON THE JENSEN'S ALPHA (or PPW)

Spearman rank correlation coefficient = 0.9324.

Table 8: *Spearman Rank Correlation Coefficients Between Various Performances Measures — Weekly Performance*

	Sharpe	Treynor	Geometric Mean	Jensen & PPW	GPM
Sharpe	1.0000	0.4941 (2.1266)	0.9706 (15.0848)	0.9118 (8.3063)	0.8059 (5.0928)
Treynor		1.0000	0.3882 (1.5763)	0.2118 (0.8107)	0.0765 (0.2870)
Geometric Mean			1.0000	0.9588 (12.6322)	0.8706 (6.6207)
Jensen & PPW				1.0000	0.9324 (9.6489)
GPM					1.0000

Note: t-ratios are in parentheses.

The Effects of Periodicity

Tables 9 and 10 examine the effects of periodicity on rankings and show that the rankings across the various measures are relatively robust with respect to the choice of periodicity (weekly or monthly data).

Table 9: *Relative Ranking of Managed Funds — for Weekly and Monthly Performance*

Managed Fund	Sharpe		Treynor		Jensen & PPW		GPM	
	W	M	W	M	W	M	W	M
Abbey Managed	11	11	10	10	11	11	8	9
Can Life/IBI Man	8	8	6	7	10	10	12	15
Eagle Star Invest	5	6	5	6	8	6	9	8
Hib. Life Man	16	16	12	16	16	16	11	16
Ir Lf Man (1)	12	12	7	9	13	13	14	11
Ir Lf Man (2)	14	14	9	12	15	15	16	14
Ir Lf Man (3)	13	13	8	11	14	14	15	13
New Ir (1)	6	7	13	8	5	5	4	4
New Ir (2)	10	10	15	14	7	7	7	7
New Ir (3)	9	9	16	13	6	8	6	6
New Ir Man (1)	4	4	14	4	3	1	3	1
Norwich Un (1)	3	3	3	3	2	4	2	3
Norwich Un (2)	2	2	2	2	1	2	1	2
Pruden Man	15	15	11	15	12	12	13	12
Standard Lf Man	7	5	4	5	9	9	10	10
Sun Life Man	1	1	1	1	4	3	5	5

Notes: W represents weekly performance measures.
M represents monthly performance measures.

Table 10: *Spearman Rank Correlation Coefficients of Performance Measures for Weekly and Monthly Performance*

		Weekly Performance			
		Sharpe	Treynor	Jensen & PPW	GPM
Monthly Performance	Sharpe	0.9971 (48.6776)			
	Treynor		0.7176 (3.8558)		
	Jensen & PPW			0.9735 (15.9371)	
	GPM				0.8088 (5.1464)

Note: t-ratios are in parentheses.

The Treynor Index is the most sensitive ranking measure with respect to periodicity due, once again, to the disproportionate sensitivity of the New Ireland fund betas to periodicity resulting in inconsistent rankings. Goodness of Fit, R^2, increases with periodicity as expected; unsystematic risk is averaged out over time.

The Effects of Risk-Free Measure on Rankings

Tables 11 and 12 confirm that the choice of risk-free rate as between the three-month Exchequer Bill and three-month Interbank rate has little impact on rankings. The funds are ranked identically on the Sharpe, Jensen and PPW ratios; the Treynor and GPM measures display high consistency.[4]

The Effects of the October '87 Crash

If we view the October '87 crash as a "once-off" event then it is permissible to identify and net out its effects on our performance results. We ran the following regression,

$$R^*_{pt} = \alpha_p + \beta_p R^*_{mt} + \delta_p D_t + u_{pt} \tag{11}$$

where D = 1 for the October Crash; D = 0 otherwise.

4. CAPM performance measures may inadequately capture diversification across equity and interest-rate risk in managed funds. This elusive concept, however, currently lacks an agreed modelling procedure. We eschewed the use of a longer-dated gilt since the correlation between the three-month interbank rate and five-year gilt rate is 0.85. (We are grateful to an anonymous referee for drawing this point to our attention.)

Table 11: *Relative Ranking of Managed Funds — Monthly Performance*

Managed Fund	Sharpe	Treynor		Jensen (or PPW)	GPM	
	I/E	*I*	*E*	*I/E*	*I*	*E*
Abbey Managed	11	10	10	11	9	9
Can life/IBI Man	8	7	7	10	15	14
Eagle Star Invest	6	6	6	6	8	8
Hib. Life Man	16	16	16	16	16	16
Ir Lf Man (1)	12	9	9	13	11	11
Ir Lf Man (2)	14	12	13	15	14	15
Ir Lf Man (3)	13	11	11	14	13	13
New Ir (1)	7	8	8	5	4	4
New Ir (2)	10	14	14	7	7	7
New Ir (3)	9	13	12	8	6	6
New Ir Man (1)	4	4	3	1	1	1
Norwich Un (1)	3	3	4	4	3	3
Norwich Un (2)	2	2	2	2	2	2
Pruden Man	15	15	15	12	12	12
Standard Lf Man	5	5	5	9	10	10
Sun Life Man	1	1	1	3	5	5

Notes: I represents 3-month interbank rate.
         E represents exchequer bills (91 days).

Table 12: *Correlation Coefficients for Different Risk-Free Interest Rates — Monthly Performance*

		3-Month Interbank Rate	
		Treynor	GPM
Exchequer Bills Rate	Treynor	0.9941 (34.3440)	—
	GPM	—	0.9147 (8.4691)

The results are presented in Table 13. Five funds performed significantly worse during the Crash; the four New Ireland funds performed significantly better. None of the funds display a significantly positive Jensen or PPW measure, although three funds display positive measures.

Our traditional performance measures are, however, significantly affected by netting out the effects of the Crash. The Sharpe and Treynor measures imply that six funds outperform the market. The same six funds are identified by both measures. None of the positive alphas are significant, however, at conventional levels. The GPM measure implies that no fund "beat the

Table 13: *The Effects of the October 1987 Crash on the Performance of Funds*

Managed Fund	$R^*_{pt}=\alpha_p+\beta_pR^*_{Mt}+\delta_pD_t$		GPM	Sharpe	Treynor
	Jensen & PPW				
	α_p	δ_p			
Abbey Managed	−0.0387 (−0.5528)	−1.3108 (−1.7707)	−0.5378	−0.0027	−0.0202
Canada Lf/IBI Man	−0.0463 (−1.0609)	−0.5262 (−1.1401)	−1.5672	0.0085	0.0326
Eagle Star	−0.0077 (−0.1581)	−2.0411 (−3.9514)	−0.2063	0.0306	0.1474
Hibernian Lf Man	−0.0594 (−1.0478)	−1.3459 (−2.2413)	−1.3994	−0.0209	−0.1032
Irish Life Man (1)	−0.0681 (−1.3849)	−0.6835 (−1.3133)	−2.6898	−0.0045	−0.0160
Irish Life Man (2)	−0.0725 (−1.4690)	−0.7011 (−1.3428)	−2.8390	−0.0087	−0.0310
Irish Life Man (3)	−0.0709 (−1.4521)	−0.6800 (−1.3153)	−2.8092	−0.0078	−0.0277
New Ireland (1)	−0.0281 (−0.5007)	1.5570 (2.6174)	−0.3893	−0.0279	−0.5190
New Ireland (2)	−0.0414 (−0.7375)	1.5573 (2.6186)	−0.5741	−0.0403	−0.7436
New Ireland (3)	−0.0414 (−0.7337)	1.5595 (2.6106)	−0.5710	−0.0401	−0.7459
New Ireland Man (1)	−0.0065) (−0.1015)	1.0473 (1.5349)	−0.0716	−0.0149	−0.6751
Norwich Union (1)	0.0770 (0.8596)	−4.5077 (−4.7530)	0.7280	0.0436	0.9585
Norwich Union (2)	0.0803 (0.9003)	−4.4907 (−4.7563)	0.7638	0.0453	0.9772
Prudential Man	−0.0576 (−1.2146)	−0.1992 (−0.3972)	−1.6251	−0.0234	−0.1061
Standard Life Man	−0.0459 (−0.9553)	0.3365 (0.6621)	−1.5336	0.0142	0.0520
Sun Life Managed	0.0030 (0.0584)	−0.7474 (−1.3718)	0.0785	0.0413	0.1773
Weighted Port	−0.0265 (−0.7795)	−0.6985 (−1.9403)	−1.1486	0.0027	0.0110
ISEQ INDEX	0.0000		1.0000	0.0793	0.1993

Note: D_t=1 for the periods corresponding to October 1987 and zero otherwise. Bracketed values correspond to associated t-ratios.

market", although the two Norwich Union funds provided sizeable returns to diversification risk and Sun Life, at least, provided a positive return unlike the remaining funds.

V CONCLUSION

Irish managed funds underperformed the ISEQ on a risk-adjusted basis over the period 1983 to 1990. This result is robust with respect to the choice of performance index.

It is also robust with respect to the choice of periodicity of the sample data as between weekly and monthly data. Moreover, the results are invariant with respect to the choice of the exchequer bill rate or inter-bank rate as the risk-free interest rate.

If the ISEQ index is an efficient benchmark portfolio then an implication of Rolls critique is that conventional test procedures are tautological and must per force yield insignificant Jensen measures. Given the small size of the Irish market the ISEQ is likely to be an inefficient benchmark. Indeed earlier evidence due to Keenan, although relating to an earlier sample period and different periodicity, suggests strongly that the ISEQ is inefficient. As noted in the text the effects according to Dybvig and Ross (1985) is to impart an upward bias to the Jensen estimates. Not withstanding this upward bias none of the reported estimates are statistically significant. It is possible to advance *ex post* rationalisations of our results in terms of market size and structure, transactions costs, exchange controls, etc. Our view, however, is that a satisfactory and compelling account necessarily requires further theoretical and empirical modelling.

The October '87 crash produced mixed effects on the performances of individual funds. Although the Sharp and Treynor measures turn positive for six of the funds when the effects of the crash are excluded none of the Jensen or PPW measures are statistically significant. Moreover, the GPM results suggest that none of the funds "beat the market".

As noted at the outset our performance assessment excludes consideration of the 3 per cent government levy and 5 per cent bid/offer spread which is borne as an additional cost by the investor and comparison with the ISEQ is flattering since the latter is most likely inefficient and being a pure capital index excludes net of tax dividend accruals. It is true of course that small investors are unlikely to be able to achieve the full risk-free exchequer bill or interbank returns on retail deposits. Moreover, they would face higher brokerage costs if they invested directly on their own account and would also be additionally liable to Capital Gains Tax. Notwithstanding these considerations the sizeable cost loadings facing the fund investor on the above findings offset most if not all of the size economies effected by the funds.

Focusing solely on the fund (offer price) performances, our results suggest the vaunted diversification, selection or timing skills of fund managers have in practice been too weak to generate any strong evidence of enhanced risk-adjusted returns. At best the verdict is *not proven*.

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