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**Learning to Value Volatility
... and profit by doing so!**

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Introduction

As successive Federal Governments progressively withdraw support for the universal old age pension, all Australians face a growing responsibility to save for their retirement.

At present, the vast majority of us do not have saving/investment plans to meet our retirement needs. We do not save enough and we invest our savings too conservatively. By the time many now in retirement, or facing retirement in the near future, came to this unhappy realisation, it was too late to remedy it.

Unfortunately, their failure to make adequate provision for their retirement needs was often primarily attributable to a simple lack of knowledge about investing for retirement. Had they known earlier what they eventually come to realise, they would have been able to make better decisions and use their resources more effectively.

There are four critical gaps in most peoples' knowledge about investing for retirement.

- The amount of money needed is an unknown. If there is any estimate at all, it is usually an under-estimate, sometimes a gross under-estimate.
- There is confusion about what is meant by "risk". When investment professionals talk about the "risk" involved with a well-constructed investment portfolio, they mean that there is uncertainty about the portfolio's specific future performance because returns will vary from one period to the next and/or the value of the portfolio will vary from time to time. Whereas, what many of us hear, is that there is a risk of losing all our money.
- The relationship between risk and return is not appreciated. Generally, the greater the risk, the greater return. Markets pay a "return premium" to those investors willing to accept uncertainty about the future performance of an investment.
- A small improvement in the average annual return of long term investments will produce a very large improvement in the final outcome. (This is often referred to as "the power of compounding returns.")

The aim of this booklet is to help investors fill the last three of these gaps. The first gap, an estimate of the amount of money required to fund retirement needs, is best filled by consultation with a professional financial planner.

With investing, "volatility" means the variability of investment returns from one period to the next and of investment values from time to time.

The more volatile the investment, the greater is this variability and, so, the greater the uncertainty about future returns and values.

Our natural preference in life is for certainty. Yet we manage to live with uncertainty every day. For example, even the most sophisticated meteorological forecasts have little accuracy more than a few days ahead. But we can still say with confidence that one location has a better climate than another or that we prefer a particular time of year.

With investing, as with many of life's challenges, we would like to be confident that we can know in advance precisely what the outcomes of our decisions will be. But

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the more volatile an investment, the less certain we can be about its returns in a given period or its value at a particular point in time.

However, as we shall see, the more potentially profitable an investment, the more volatile it tends to be. If we can learn to live with investment volatility, we can expect to profit by it.

The Risk/Return Connection

We are all familiar with the saying, “Nothing ventured, nothing gained”, but we have difficulty applying it in our investing behaviour.

Our perceptions are that there is a clear risk of major loss in the short term, whereas the potential gains are distant, vague and marginal. We choose “safe” alternatives based on short term considerations, little realising the damage this does to our longer term financial well-being.

In talking about investment, the discussion can be simplified by categorising investments into asset classes. Here we will use four classes¹:

Cash which includes actual cash, savings accounts and term deposits.

Fixed Interest which includes bonds, debentures and mortgages.

Property which includes residential, retail, commercial, industrial and rural property.

Shares which includes all the varieties of shares traded on stock exchanges.

The general public perception is that

- share investments are more risky than property investments,
- property investments are more risky than fixed interest investments, and
- fixed interest investments are more risky than cash investments

Investment professionals would agree with this hierarchy of risk, though they would be thinking of risk in terms of volatility. But investment professionals also accept as a general rule that, **over the long term**,

- share investments will outperform property investments,
- property investments will outperform fixed interest investments, and
- fixed interest investments will outperform cash investments,

While there will be some periods, perhaps even years, where this rule does not work, there is abundant evidence that the rule holds over the long term

Why is this so? There are both practical reasons and historical evidence to show that this rule applies.

A short statement of the practical reasons is that

- Lenders who ‘borrow short to lend long’, e.g. who take money on deposit and then lend for a fixed term, must make a profit or they will go out of business. Hence, longer term interest rates will be higher than short term interest rates and, so, fixed interest investments can be expected to outperform cash investments.
- Property investors must earn a greater return from their investment than the interest they pay on the money they borrow to make the investment or they will go out of business. Hence, property investments can be expected to outperform fixed interest investments.

¹ Some comment is required about the over-simplification that this categorisation represents.

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- Companies rent property from which to conduct their businesses because they expect to make more from running their businesses than from owning the property. Hence, investments in companies (share investments) can be expected to outperform property investments.

Further, there is an abundance of supporting historical evidence for the general rule that risk and return are related. Many, many studies have confirmed these results in different markets for as long as records have been kept, which is hundreds of years in some cases.

To illustrate the nature of this evidence, we have recently completed a study of the 20 years from July 1, 1979 to June 30, 1999. The study is described fully in Appendix: Study Methods. Extracts from its findings will be used throughout this booklet.

Over the twenty-year period, during which the annualised rate of inflation was 5.2%, our four asset classes produced the following annualised returns.

	Average Annual Return
Cash	10.6%
Fixed Interest	11.8%
Property	13.8%
Shares	15.4%

Fig 1

So, there are both practical reasons and historical evidence to support the view that, over the long term, higher risk investments can be expected to outperform lower risk investments.

This booklet will return to the topic of the comparative performance of asset classes and the relationship between risk and return. However, investors seeking to achieve specific goals do so by way of investment portfolios and it is now time to turn to this topic.

Investment Portfolios

The term “portfolio” is used to describe a collection of individual investments, whether this collection is simply the end result of a series of unrelated investment decisions, as many portfolios are, or is one that has been deliberately constructed as part of a financial plan.

Investment professionals often use industry jargon when talking about investment portfolios. One of the purposes of the ProQuest Risk Profiling system² is to help bridge the communication gap that this jargon creates.

The ProQuest system uses seven different portfolios, each of which corresponds to a specific mix of investments. The investments are classified as low risk/return, medium risk/return or high risk/return. Cash and term deposits are considered to be low risk/return. Shares and property are considered to be high risk/return.

The ProQuest portfolios are:

Portfolio	Risk/Return Mix		
	Low	Medium	High
1	100%	0%	0%
2	70%	30%	0%
3	50%	40%	10%
4	30%	40%	30%
5	10%	40%	50%
6	0%	30%	70%
7	0%	0%	100%

Fig 2

The first step in bridging the communication gap is to express these portfolios in terms of Defensive/Growth splits. It is common industry practice to divide all investments into two groups - Defensive and Growth, depending on whether they emphasise short term security or long term performance.

Expressed in terms of a Defensive/Growth split³, the ProQuest portfolios become:

Portfolio	Defensive/Growth Split	
	Defensive	Growth
1	100%	0%
2	85%	15%
3	70%	30%
4	50%	50%
5	30%	70%
6	15%	85%
7	0%	100%

Fig 3

² It is assumed that the reader has used ProQuest system to produce his or her Personal Financial Risk Profile. Comment is needed about plain English nature of the questionnaire and group descriptions.

³ Comment is needed about how the Defensive/Growth split is produced from the low/medium/high.

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The second step in bridging the communication gap is to express these portfolios in terms of Asset Allocations. The Defensive/Growth split provides a broad general description of an investment portfolio. A more detailed description uses Asset Allocation, where individual investments are grouped by asset type.

Asset types commonly used are Cash, Bonds, Australian Property, Australian Shares and International Shares. When constructing a portfolio to meet a specific investment strategy, industry professionals begin by setting an Asset Allocation.

Expressed in terms of an Asset Allocation, the ProQuest portfolios become:

	Asset Allocation				
Portfolio	Cash	Bonds	Australian Shares	Australian Property	International Shares
1	40%	60%	0%	0%	0%
2	35%	50%	10%	0%	5%
3	30%	40%	15%	5%	10%
4	20%	30%	25%	10%	15%
5	10%	20%	40%	10%	20%
6	5%	10%	50%	10%	25%
7	0%	0%	60%	10%	30%

Fig 4

Investment Performance

We would all like to know how our investments will perform in the years ahead.

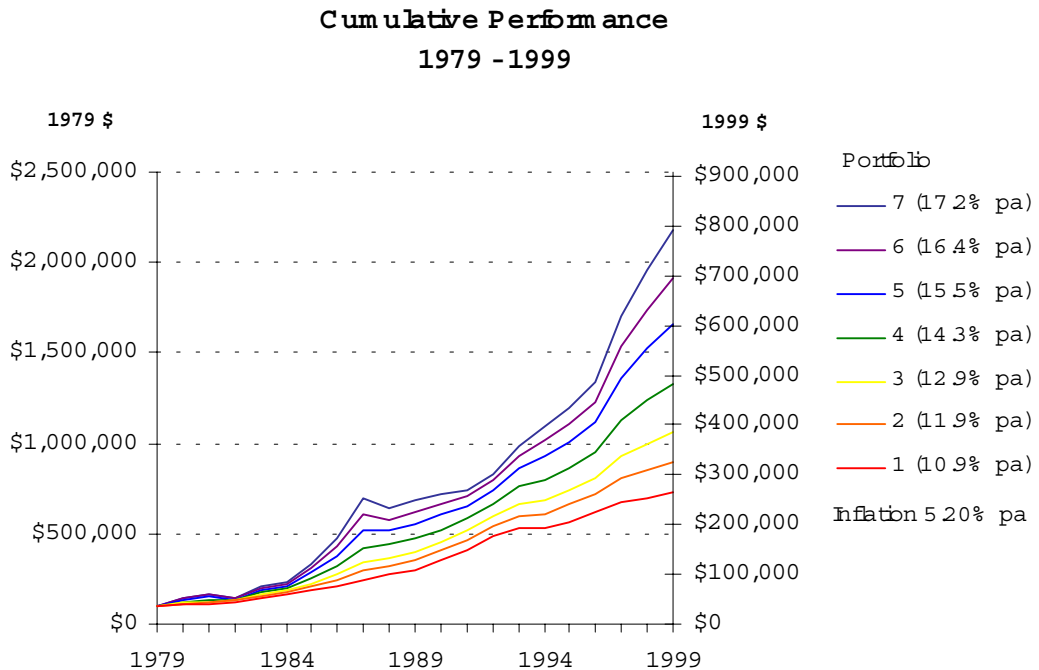
Unfortunately, no-one can tell us with any precision. But we can look at the past to see what the consequences of adopting a particular strategy would have been.

While the past is only an imperfect predictor of the future, it is the best guide we have to the likely patterns of future investment performance.

How would the seven ProQuest portfolios have performed over the twenty years starting July 1, 1979?

1979 –1999

The chart shows the performance over the full twenty years of an initial investment of \$100,000. To ensure that like is being compared with like, all returns quoted are cumulative, i.e. both the income received during the period and the value of the investment at the end of the period are taken into account when calculating the



return.

Fig 5

Clearly, the riskier the portfolio, the better its performance. Portfolio 7 would have produced an overall return three times that of Portfolio 1.

But what about the 'bad' times during this 20 year period? What about 1987 and 1994?

1987

Despite the well-deserved notoriety of the 'Crash of '87', the results for the year as a whole were not too gloomy.

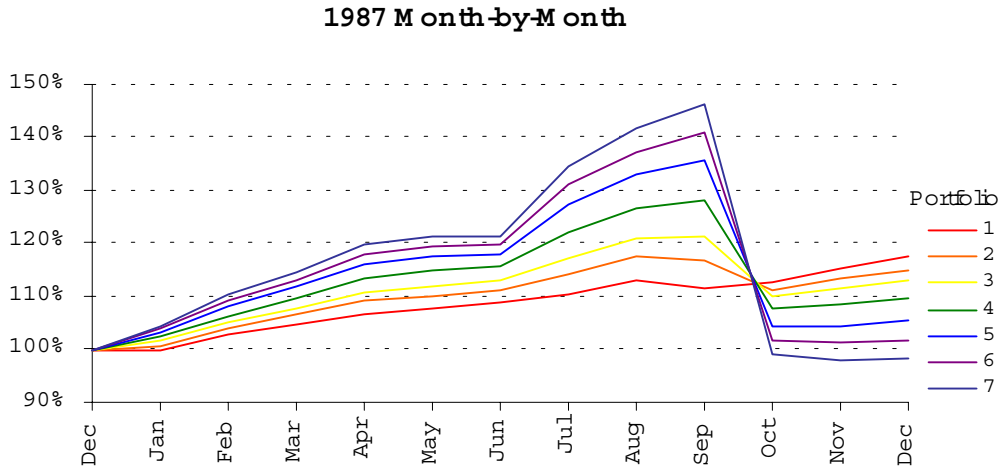


Fig 6

For those who were invested throughout the year, the 'boom' in the first nine months cushioned the impact of the 'bust' in October. It is interesting to note that for the year as a whole, only Portfolio 7 earned a negative return.

Most long term investors have diversified portfolios comprising a mix of asset classes. The Crash of '87 effected Australian and International Shares but left the rest of the portfolios unscathed

However, October 1987 was a scary month for stock markets.

The media had a field day. Banner headlines in the newspapers. Nightly TV news featuring near-chaos in stock-market trading rooms, shell-shocked day traders and other attention-grabbing video clips.

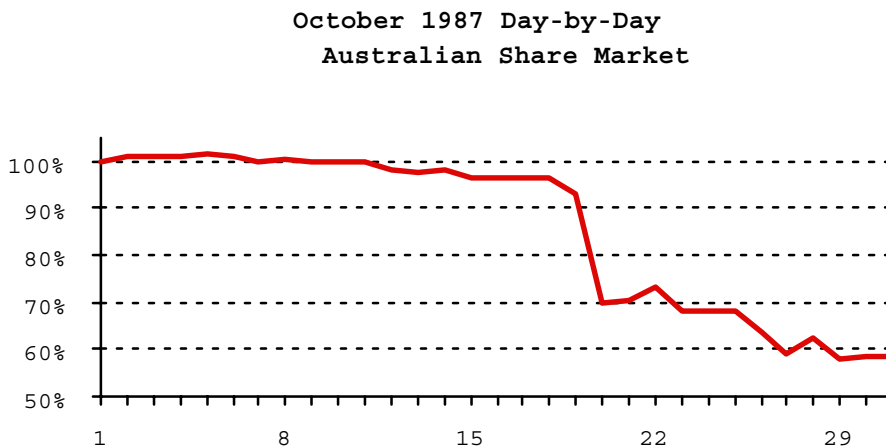


Fig 7

During the third week of October many investors feared the fall would continue and there were doomsayers in the media who predicted that it would. But, if you had been marooned on a desert island with no news throughout 1987, when you

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returned to civilisation and checked the performance of your investment portfolio, you would have wondered what all the fuss was about.

While October '87 was dramatic, its effects were confined to shares and it was over quickly - 1994 was a different kettle of fish entirely.

1994

Both share and bond markets declined throughout the year. Usually, they move out of sync with one another. When one is up the other is down⁴, but not in 1994.

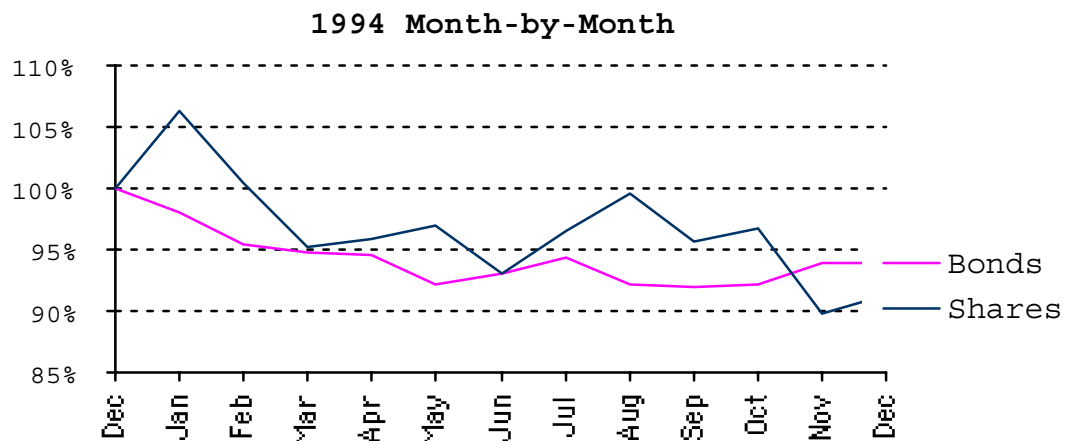


Fig 8

All seven investment portfolios would have been caught up in the decline.

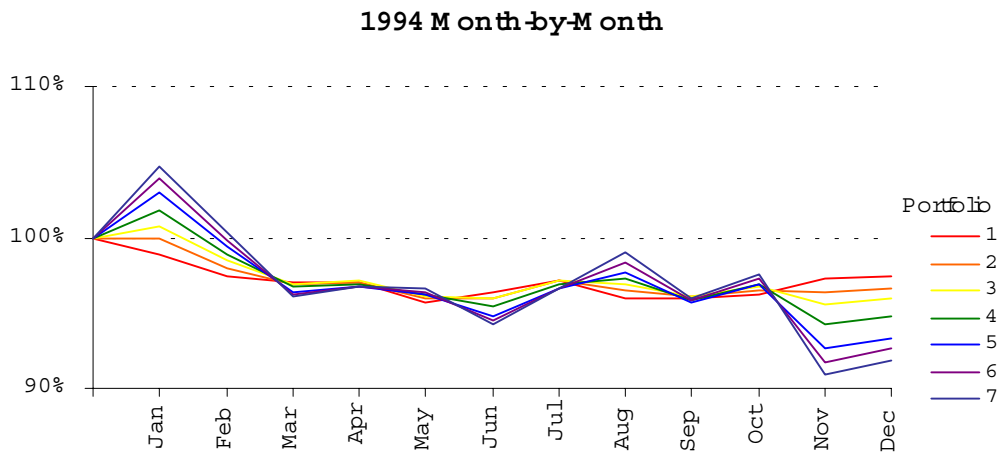


Fig 9

For long term investors, the 1994⁵ year was clearly worse than the 1987 year. But because the events of 1987 were more newsworthy, it is the better known of the two by far.

⁴ Some comment on why they usually don't move together is needed.

⁵ Some comment on 1973-74 could be appropriate

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So, while the riskier portfolios produced superior performance over the twenty years, they were scarier in bad times. However, most new investors are surprised by both how much better the superior performance was and how less worse the bad times were.

We will look at this in more detail later in the booklet.

Selecting a Portfolio to Meet Retirement Needs

Portfolio selection is a decision that is best made in the context of a financial plan prepared in consultation with a professional financial adviser.

A financial adviser can assist in the process of translating our needs and wants into a set of quantified, prioritised and dated financial goals. By examining our current and anticipated financial resources, the adviser is able to formulate plans as to how these might be best applied in the achievement of our goals. **Where, as is common, not all our goals are achievable, the adviser can assist us in re-evaluating them and/or striking compromises.**

All financial plans will include retirement planning, though for the young this may be a background consideration. There are two key issues in retirement planning.

Pre-retirement, the key issue is how best to accumulate sufficient funds to provide for anticipated retirement needs.

Post-retirement, the key issue is how best to apply the accumulated funds to meet actual retirement needs.

Retirement planning is a particular example of planning for a saving/spending cycle. Others include saving for a home and, increasingly nowadays, saving for our children's education. However, the magnitude of the sums of money involved make retirement planning far and away the most important saving/spending cycle for the great majority of us.

In days gone by, when life expectancies were shorter and it was the norm to work until retirement at age 60 or 65, the post-retirement timeframe was more commonly a medium term one. Now, both saving and spending occur over the long term.

It is in the performance of our retirement investments, during both the saving and spending phases, where the compounding of small increases in average yearly performance has the most dramatic effect on the eventual outcomes.

In the saving phase, the average rate of return determines the amount of funds accumulated.

In the spending phase, the average rate of return determines how long the accumulated funds will last.

The Saving Phase

To illustrate the compounding effect of different average rates of return in the saving phase, we have taken as an example an investor who

- in 1979, was earning the average wage of \$14,300 and had \$5,000 accumulated in superannuation, and for whom
- from 1979 until 1999, superannuation contributions were 6% of salary which increased at the rate of inflation.

The chart below shows what would have been achieved for each of the seven ProQuest portfolios.

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Saving for Retirement 1979 - 1999

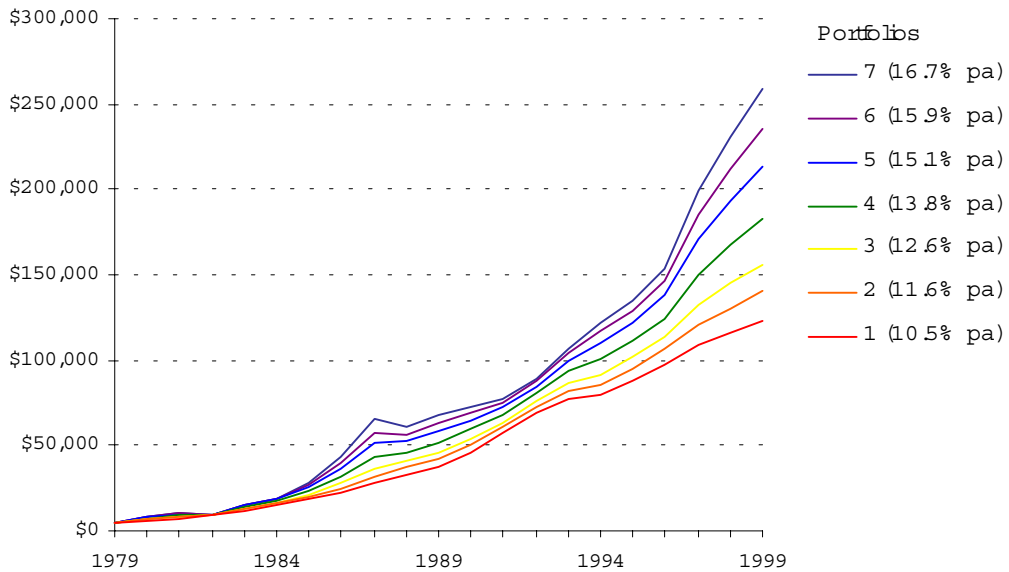


Fig 10

The differences are dramatic. At the extremes, if our investor chose Portfolio 7 rather than Portfolio 1, the funds accumulated would have more than doubled from \$123,400 to \$259,500.

So, it is clear that, for the period 1979 -1999, the more risky the portfolio the greater the monies available to meet retirement needs.

Let us see how someone entering retirement in 1979 might have fared over the 20 years since.

The Spending Phase

To illustrate the compounding effect of different average rates of return in the spending phase, we have taken as an example a retiree who

- began retirement on July 1 1979 with accumulated retirement funds of \$100,000, and
- each year drew \$10,100 (70% of the average wage) increased at the rate of inflation to meet retirement needs.

We have assumed that the retiree was not eligible for an Age Pension. While such would not have been the case in 1979-1999 and is not the case today, the aging of the population continues to put increasing pressure on taxpayer-funded Age Pensions. The results that the retiree would have experienced from investing in the different portfolios are shown in Fig 11.

**Spending in Retirement
1979 - 1999**

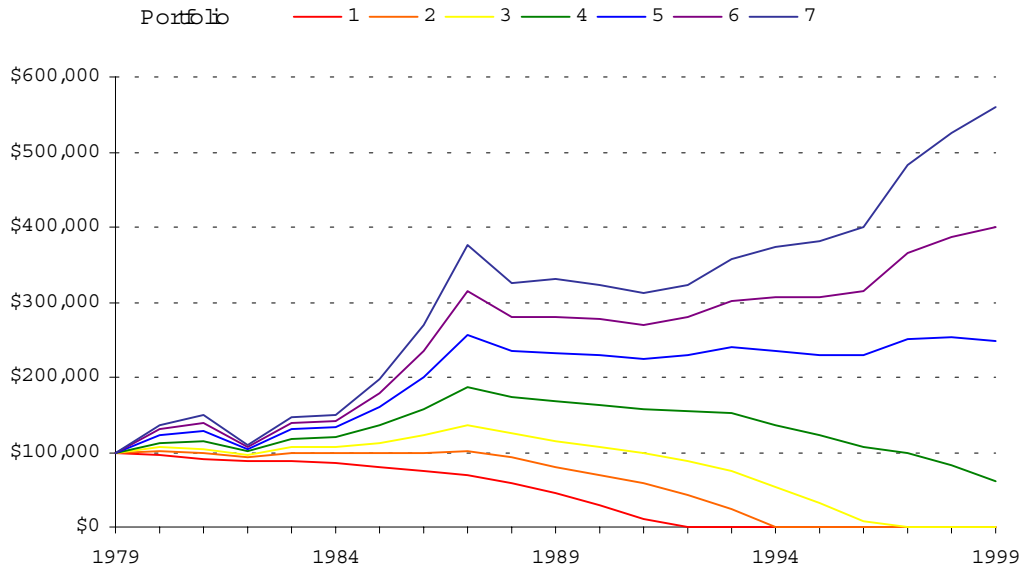


Fig 11

Again, the differences are dramatic. Portfolios 1, 2 and 3 would have run out after 13, 15 and 18 years, respectively, and Portfolio 4 would have been on the way to running out. Whereas Portfolio 5 would have plateaued at around two and a half times its initial value, and Portfolios 6 and 7 would have continued to grow.

Another way to look at the same issue is in terms of the sum required on July 1, 1979 to fund 20 years of annual drawings of \$10,100, indexed for inflation, as shown in Fig 12.

**Amount Required on July 1, 1979 to Fund
\$10,100 pa (indexed) for 20 Years**

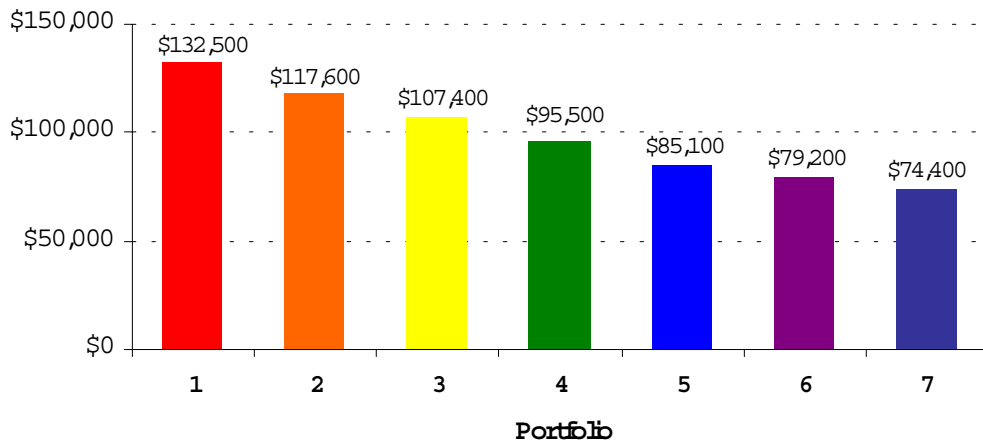


Fig 12

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Comparing the two extremes, to produce the same result, a retiree invested in Portfolio 1 would have needed almost twice the retirement funds as a retiree invested in Portfolio 7.

So, it is clear that, for the period 1979 -1999, the more risky the portfolio the longer the monies available to meet retirement needs would have lasted. Or, alternatively, the riskier the portfolio the less monies would have been needed to fund a given retirement need.

Additionally, it should also be clear that where the goal was to provide drawings for a given number of years, the riskier the portfolio the greater the amount that could have been drawn each year.

If we could be guaranteed that the future would be an endless repetition of the last 20 years, then we could choose high risk portfolios for both the saving and spending phases of our retirement planning, being completely confident that this would produce the best result. But, of course, life is never that simple. We cannot be certain how investment markets will behave in the future.

Further, our financial goals are not necessarily best served by maximising the expected long term return on our investments. For example, if we had determined that we needed \$500,000 of accumulated retirement funds to meet our retirement needs, and we were given a choice between,

- Portfolio A which was expected to provide somewhere between \$500,000 and \$700,000, with an average of \$550,000, and
- Portfolio B which was expected to provide somewhere between \$400,000 and \$900,000 with an average of \$ 600,000,

most of us would choose Portfolio A because our primary aim is to ensure that we have enough for our retirement. While it would be nice to have more than enough, we don't want to risk having less than enough.

Additionally, bad times such as the last quarter of 1987 and the whole of 1994 will be worrying for most of us. How much worry will we accept in seeking higher returns? Can we be sure we won't panic and sell? Those that do, usually don't get back into the investment markets until a recovery is well established and prices are well above those at which they sold. These people would have been better off with a less ambitious portfolio that they would have been able to persevere with during the rocky patches.

In order to consider these issues more broadly, we need to examine the characteristics of the seven Risk Groups in more detail.

The ProQuest Risk Groups

The ProQuest Risk Profiling System calculates a risk tolerance score on a 0 -100 scale. To simplify communication, the scale is divided into seven Risk groups as shown in Fig 12 and a description has been developed for each group based on how members of that group typically answer the risk tolerance questionnaire.

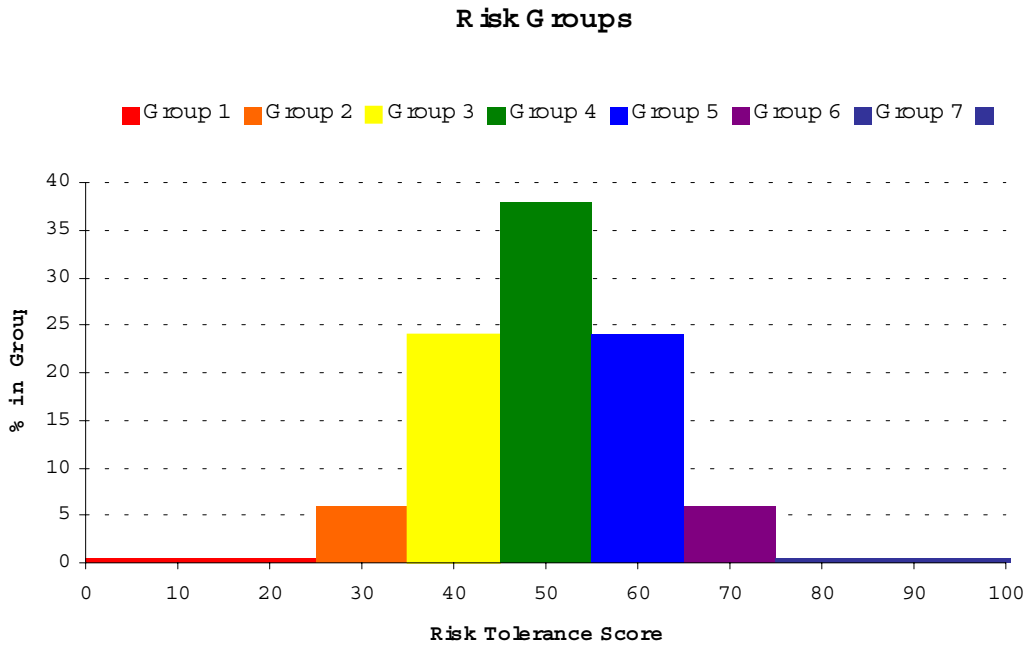


Fig 13

For the purposes of this booklet, we focus on the section of the group description that relates to investment and consider three specific aspects for each risk group:

The Preferred Portfolio

As discussed in Investment Portfolios above, the ProQuest portfolios are described in terms of a mix of investments, where an investment is classified as low, medium or high risk/return. The risk tolerance questionnaire presents seven portfolios from which to choose.

Portfolio	Risk/Return Mix		
	Low	Medium	High
1	100%	0%	0%
2	70%	30%	0%
3	50%	40%	10%
4	30%	40%	30%
5	10%	40%	50%
6	0%	30%	70%
7	0%	0%	100%

Fig 14

Return Expectations

The risk tolerance questionnaire asks about ten year return expectations expressed as a multiple of the rate of return from term deposits.

Sensitivity to Volatility

The risk tolerance questionnaire asks about sensitivity to volatility in terms of the level to which the total value of all investments could fall before the person would begin to feel uncomfortable.

The answers typically given by each of the risk groups are as shown in Fig 15.

	Risk Group						
	1	2	3	4	5	6	7
Preferred Portfolio	1 or 2	2	3	4	5	6	7
Return Expectations (as a multiple of the term deposit rate)	1 – 1.5 x TD	1 – 1.5 x TD	1.5 – 2 x TD	1.5 – 2 x TD	2 - 2.5 x TD	At least 3 x TD	More than 3 x TD
Sensitivity to Volatility	Any fall	Any fall	10% fall	20% fall	20% fall	33% fall	50% fall

Fig 15

There is a clear progression as risk tolerance increases:

- the Preferred Portfolio becomes more weighted to Growth,
- Return Expectations increase, and
- Sensitivity to Volatility decreases.

But what are the consequences of applying a particular Risk Group's characteristics to an investment strategy? And are the characteristics internally consistent, i.e. can the Preferred Portfolios provide the expected returns and/or satisfy the sensitivities to volatility?

To help answer these questions, we have analysed the previous twenty years of investment market performance for each of the seven risk groups. We did this by testing how each group's preferred portfolio would have performed in terms of the group's return expectations and sensitivity to volatility.

We began by converting the preferred portfolio from a low/medium/high mix to a defensive/growth split and then to an indicative asset allocation for modelling purposes.

Taking Risk Group 4 as an example, the Defensive/ Growth split is 50/50 and the indicative asset allocation is

- 30% Cash,
- 20% Bonds,
- 25% Australian Shares,
- 10% Australian Property, and
- 15% International Shares.

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The performance of an investment portfolio with this asset allocation was then analysed for the period July 1, 1979 to June 30, 1999. The details of the methodology we used are explained in Appendix: Study Methods.

The performance of Portfolio 4 was as follows:

Monthly Performance

There are 240 months in the 20 year period and the pattern of monthly returns was as shown in the Fig 16.

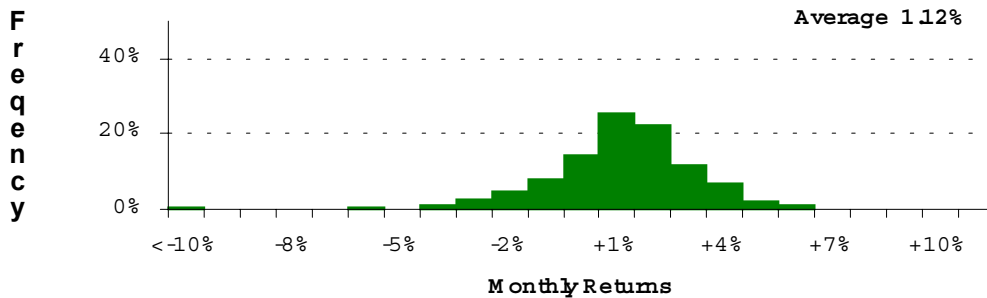


Fig 16

For 40 of the months (17%), the returns were negative. The best month was +7% and the worst was -16% , with the average being +1.12%.

Yearly Performance

There are 229 periods of twelve months in the 20 years, the first being July 1, 1979 to June 30, 1980, the second being August 1, 1979 to July 31, 1980 and so on. The yearly returns were as shown in Fig 17.

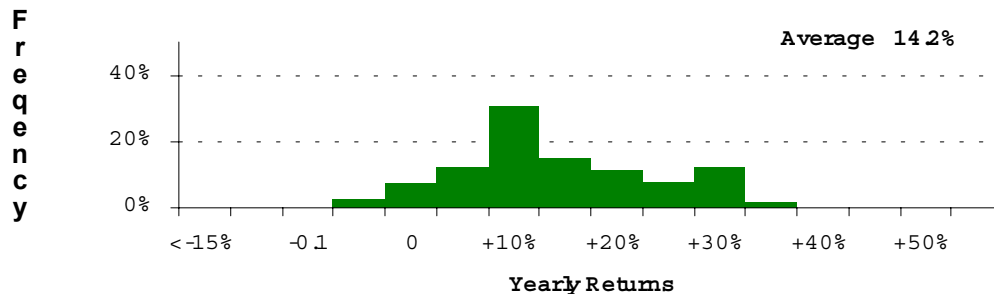


Fig 17

For 3 of the years (3%), the returns were negative. The best yearly return was +35% and the worst was -5% , with the average being +14.2%.

Ten Yearly Performance

There are 121 periods of one hundred and twenty months in the 20 years, the first being July 1, 1979 to June 30, 1990, the second being August 1, 1979 to July 31, 1990 and so on. The ten yearly returns were as shown in Fig 18.

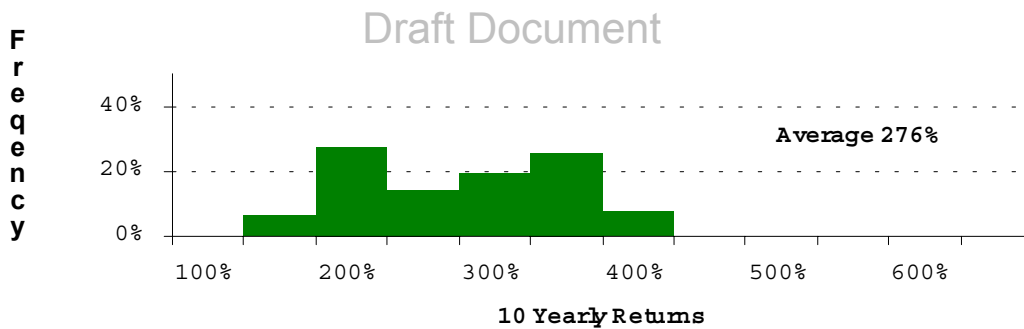


Fig 18

The best ten yearly return was +400% and the worst was +150%, with the average being +276%.

Actual Performance against Return Expectations

In order to test Portfolio 4's actual performance against return expectations, the performance needs to be expressed as a multiple of the term deposit return rate for the period in question, as shown in Fig 19.

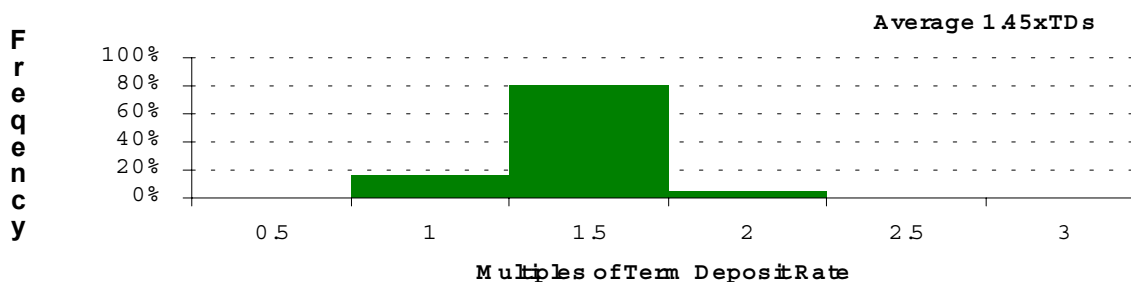


Fig 19

Risk Group 4 investors who invested in their preferred portfolios would have been disappointed with their returns much of the time in the 20 year period. The average return was less than the lower limit of their expectations. The upper limit was only achieved 5% of the time and was never exceeded.

Actual Performance against Sensitivity to Volatility

Typically, Risk Group 4 investors begin to feel uncomfortable when the value of their investments falls by 20%. As was seen above, the biggest monthly fall was 16% and the biggest yearly fall was 5%. However, since negative runs can occur, i.e. values can fall over periods of several months, we need to consider these as well.

The negative runs experienced by Portfolio 4 are summarised in Fig 20.

<u>Negative Run (months)</u>	<u>Number of Times</u>
1	26
2	4
3	2
4-6	2
7-12	1
12+	0
Total	35

There were 35 periods of one month or longer where the value of the portfolio fell before it began to recover.

The largest fall was 16% which lasted one month.

The longest negative run lasted 10 months during which the value of the portfolio fell by 7%.

Fig 20

Risk Group 4 investors who invested in their preferred portfolios would not have been taken outside their ‘comfort zone’ at any time during the 20 years. Even though in October 1987 and during 1994, particular investments would have fallen by more than 20%, the value of their portfolios would not because of their diversification across asset classes.

Actual Performance Overall

On balance, Risk Group 4 investors who invested in their preferred portfolios are likely to have been disappointed with their results.

While they might not have lain awake at night worrying at any time during the 20 years they would not, in most cases, have enjoyed the returns they hoped for.

This pattern applies generally across all Risk Groups as can be seen in the group-by-group summaries in Appendix: Risk Groups.

One can consider the choice of a preferred portfolio to be a trade-off between risk and return. **Most people, left to their own devices, will give priority to avoiding risk at the cost of not meeting their long-term return expectations.**

In many cases, this choice can be attributed to a lack of information about the extent of the risk and the long term consequences of trying to avoid risk

Learning to Value Volatility: What If?

We hope that by now this booklet has gone some of the way to filling in the three knowledge gaps targeted in the introduction, namely,

- There is confusion about what is meant by “risk”. When investment professionals talk about the “risk” involved with a well-constructed investment portfolio, they mean that there is uncertainty about the future performance of the portfolio because returns may vary from one period to the next and/or the value of the portfolio may vary from time to time. Whereas, what many of us hear, is that there is a risk of losing all our money.
- The relationship between risk and return is not appreciated. Generally, the greater the risk, the greater return. Markets pay a “premium” to those investors willing to accept uncertainty about the future performance of an investment.
- A small improvement in the average annual return of long term investments will produce a very large increase in the final value of those investments. (This is often referred to as the power of compounding returns.)

We are now ready to consider the consequences of accepting higher risk for specific investors and we begin with those in Risk Group 4 whose investment characteristics are:

Preferred Portfolio: 30% Low, 40% Medium, 30% High

Return Expectations: Ten year return of 1.5 to 2 times the term deposit rate.

Sensitivity to Volatility: Total value of investments could fall by 20% before the investor would begin to feel uncomfortable.

Accepting Greater Volatility

What would happen to Risk Group 4 investors if they chose Portfolio 5 or 6, rather than their preferred Portfolio 4? Looking at the past 20 years we can see there would have been a difference in the volatility as shown in Figs 21 and 22.

<u>Negative Run</u> (months)	<u>Number of Negative Runs</u>		
	<u>Portfolio 4</u>	<u>Portfolio 5</u>	<u>Portfolio 6</u>
1	26	28	26
2	4	4	7
3	2	3	5
4-6	2	2	2
7-12	1	1	1
12+	0	0	0
Total	35	38	41

Fig 21

	<u>Portfolio 4</u>	<u>Portfolio 5</u>	<u>Portfolio 6</u>
Deepest Negative Run	A fall of 16% which lasted one month.	A fall of 23% which lasted one month.	A fall of 28% which lasted two months.
Longest Negative Run	10 months for a fall of 7%.	12 months for a fall of 10%.	12 months for a fall of 15%.

Fig 22

The higher risk of Portfolios 5 and 6 would have taken Risk Group 4 investors out of their -20% comfort zone, but on only one occasion in each case and then not by much nor for long.

So if the downside of accepting more risk would have been only marginally worse, how would the upside have compared? Let us look first at performance against ten year return expectations as shown in Fig 23. Risk Group 4's expectations are for a return of 1.5 to 2 times the term deposit rate.

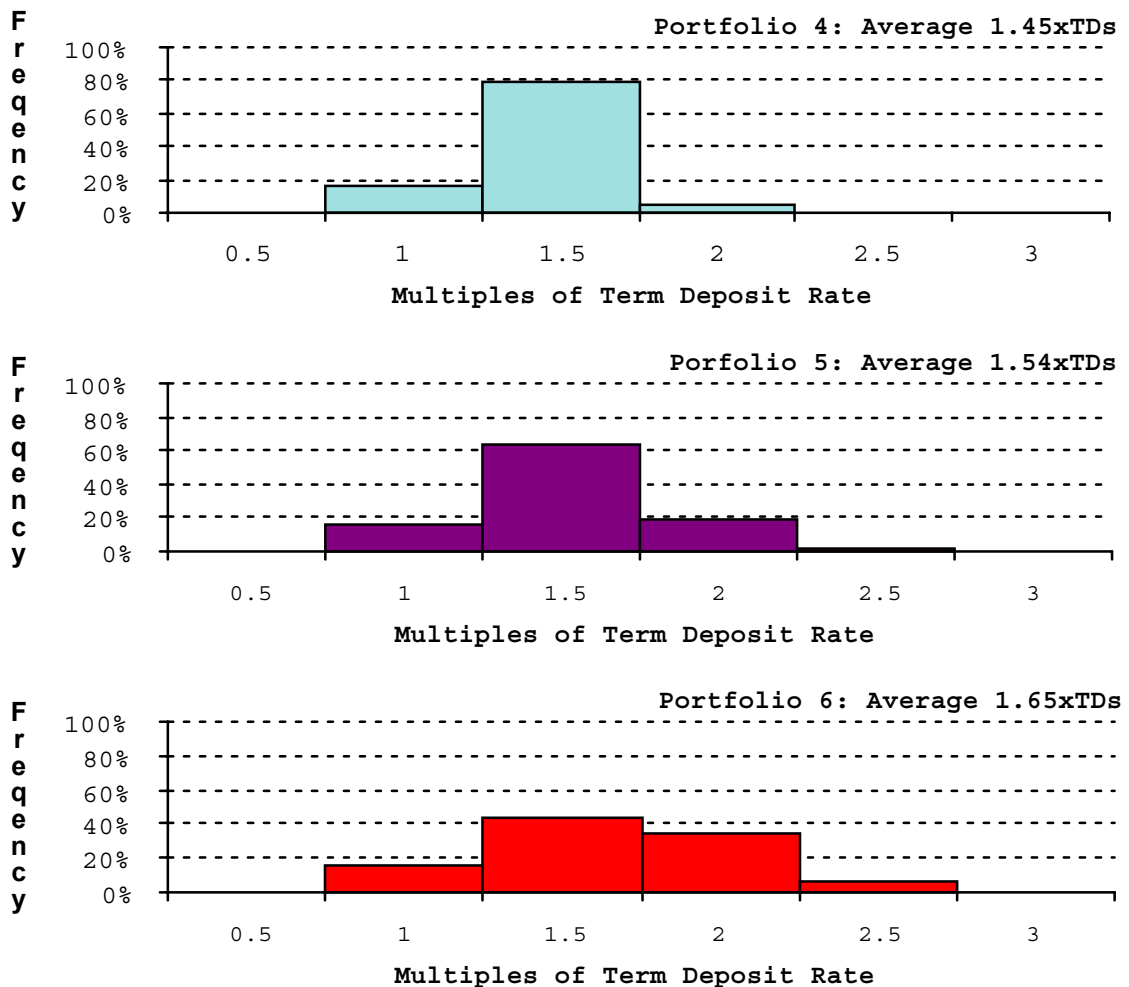


Fig 23

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Increasing the risk would clearly have increased the return. With Portfolio 4, Risk Group 4 investors would have, on average, fallen short of the lower limit of their return expectations (1.45 x TDs versus 1.5 x TDs.) Whereas with Portfolio 5 they would have averaged just above the lower limit and with Portfolio 6 they would have averaged comfortably above the lower limit.

To illustrate the effect of this improvement in returns we revisit our **saving for retirement** example as shown originally in Fig 10. This example assumes an investor who

- in 1979, was earning the average wage of \$14,300 and had \$5,000 accumulated in superannuation, and for whom
- from 1979 until 1999, superannuation contributions were 6% of salary which increased at the rate of inflation.

The different results that would have been achieved from investing these monies in Portfolios 4, 5 and 6 are shown in Fig 24.

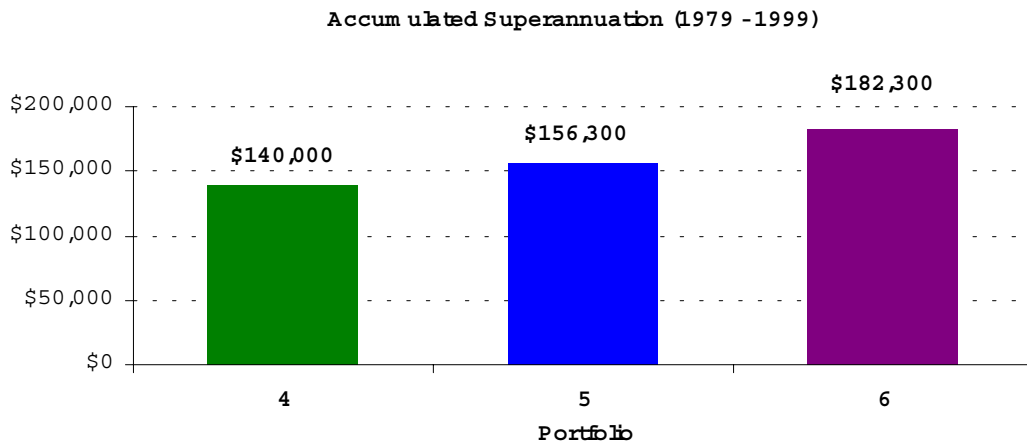


Fig 24

If these monies had been invested in Portfolio 4 the total accumulated would have been \$140,000. However Portfolio 5 would have produced \$156,300 (11% more than Portfolio 4) and Portfolio 6 would have produced \$182,300 (30% more than Portfolio 4.)

Further illustration of the improvement can be obtained from revisiting our **spending in retirement** example originally shown in Fig 11. This example assumes a retiree who

- began retirement on July 1, 1979 with accumulated retirement funds of \$100,000, and
- each year drew \$10,100 (70% of the average wage) increased at the rate of inflation to meet retirement needs.

The differing results that would have been achieved from investing the accumulated retirement funds in Portfolios 4, 5 and 6 are shown in Fig 25.

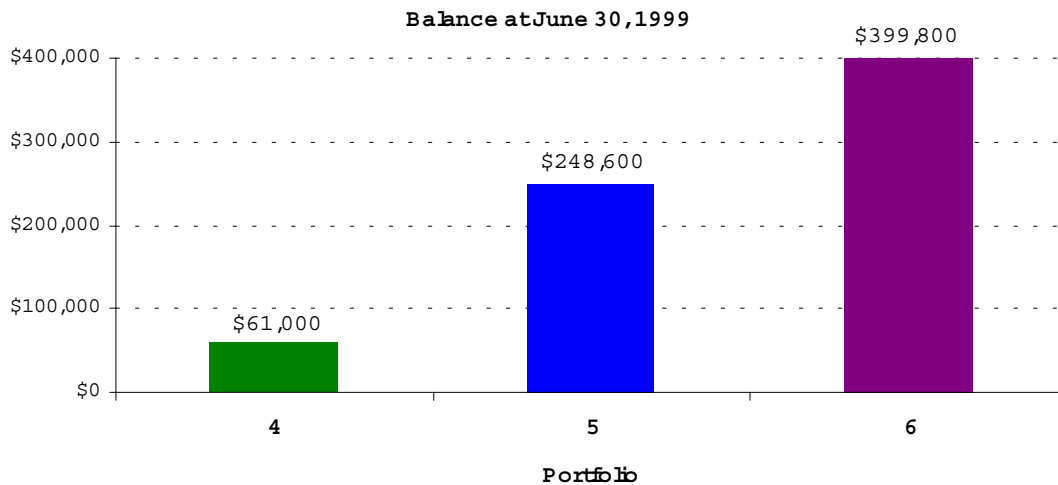


Fig 25

If the \$100,000 had been invested in Portfolio 4, the balance after 20 years would have declined to \$61,000. Whereas, with Portfolios 5 and 6 the balance would have increased.

As we saw in Fig 11, spending in retirement, while Portfolio 5 appears to have plateaued at around \$250,000, Portfolio 6 has reached \$400,000 and is still growing. In practice, unless our retiree's objective was to maximise the size of the estate, the superior performance of Portfolios 5 and 6 would likely have been used to fund an increase in retirement spending. **By 1999, inflation has increased the annual drawing to \$27,500. At that rate Portfolio 4 will not last another three years. Whereas, with Portfolios 5 and 6, the retiree need not fear living too long.**

A summary of the Risk Group 4 analysis set out above together with similar summaries for Risk Groups 2 and 3 are contained in Appendix: Comparative Analysis.

Conclusions

Risk Group 4 investors would have stayed within their comfort zone if they had invested in their preferred portfolio but, on average, they would not have met their return expectations. To meet their return expectations they would have had to invest in a riskier portfolio which would have taken them outside their comfort zone ... but not often, nor far, nor for long.

For many, the considerable difference in end results, whether saving for retirement or spending in retirement, would have more than compensated for any temporary, additional discomfort experienced along the way.

These conclusions hold true generally for all the lower risk groups. This is not to say that everyone in a lower risk group should rush into a higher risk portfolio. The primary consideration is the extent to which a given portfolio will satisfy both emotional and financial needs.

However, to make the best decision, it is crucial for an investor to appreciate the value of volatility. This does not have to happen immediately. Retirement planning is of its nature long term; a slow start does not mean that retirement

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needs will not be met. Further, as someone becomes more familiar with the issues their risk tolerance usually increases. But investors who start off in a low risk portfolio should review that decision before it is too late to benefit from an increase in risk!

Appendices

(To be completed)

A: Study Methods

Objectives

Within a general objective of making it easier for consumers to accept greater risk where it is in their best interests to do so, the study has three specific objectives:

- to the extent that consumers' fear of investment risk is a fear of the unknown, to reduce that fear by demonstrating the nature of the risks associated with investment portfolios, including the likely frequency and magnitude of any negative returns;
- to educate consumers about the relationship between risk and return in investment portfolios; and
- to give consumers a better appreciation of how small differences in an investment portfolio's average annual rate of return will cause large differences in the results achieved over the long term,

While recognising that the future will not be an unvarying repetition of the past, the patterns evident in the past are the best guide we have to the patterns we will experience in the future. And it is feel for and an understanding of patterns and relationships that we are trying to achieve.

With this in mind, we analysed what would have happened with a representative range of investment portfolios during the twenty-year period from July 1, 1979 to June 30, 1999.

Portfolio Selection

In selecting the portfolios to be studied, our aim was to cover the range of risk tolerance evident in the community. This is a wider range than is normally on offer from investment advisers and fund managers who do not usually construct portfolios with very low risk.

The risk (and return) of a portfolio is directly related to the proportion of Growth Assets, i.e. Shares and Property, which can range from 0% to 100%. The balance of the portfolio will be held in Defensive Assets, i.e. Cash and Fixed Interest. Hence, the Defensive/Growth split of a portfolio is convenient and understandable basis for classification.

However, consumers do not usually think of their investments in terms of Defensive/Growth splits.

In researching the ProQuest risk tolerance questionnaire, we found that consumers were most comfortable with a "high /medium/ low" terminology as employed in Q 16, viz

Most investment portfolios have a spread of investments - some of the investments may have high expected returns but with high risk, some may have medium expected returns and medium risk, and some may be low risk/low return. (For example, shares and property would be high risk/high return whereas cash and term deposits would be low risk/low return.)
(...continued over page)

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Which spread of investments do you find most appealing? Would you prefer all low risk/low return, all high risk/high return, or somewhere in between?

Spread of Investments in Portfolio

<u>Portfolio</u>	<u>High Risk/Return</u>	<u>Medium Risk/Return</u>	<u>Low Risk/Return</u>
1	0%	0%	100%
2	0%	30%	70%
3	10%	40%	50%
4	30%	40%	30%
5	50%	40%	10%
6	70%	30%	0%
7	100%	0%	0%

These seven “high/medium/low” portfolios, which do cover the range of risk tolerance evident in the community, can be readily converted into Defensive/Growth splits by treating Low as Defensive, High as Growth and splitting Medium 50/50 between Defensive and Growth. Expressed as such, the ProQuest portfolios become:

<u>Portfolio</u>	<u>Defensive/Growth Split</u>	
	<u>Defensive</u>	<u>Growth</u>
1	100%	0%
2	85%	15%
3	70%	30%
4	50%	50%
5	30%	70%
6	15%	85%
7	0%	100%

Portfolio Construction

The starting point for portfolio construction is to determine sector allocations.

We chose to use five sectors: Cash, Bonds, Australian Property, Australian Shares and International Shares. We recognise that many actual portfolios will use more sectors, for example, by splitting Bonds into Australian Bonds and International Bonds. However, for our purpose of illustrating patterns and relationships, this level of dissection is sufficient. The sector allocations we chose were:

<u>Portfolio</u>	<u>Sector Asset Allocation</u>				
	<u>Cash</u>	<u>Bonds</u>	<u>Australian Property</u>	<u>Australian Shares</u>	<u>International Shares</u>
1	40%	60%	0%	0%	0%
2	35%	50%	0%	10%	5%
3	30%	40%	5%	15%	10%
4	20%	30%	10%	25%	15%
5	10%	20%	10%	40%	20%
6	5%	10%	10%	50%	25%
7	0%	0%	10%	60%	30%

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These sector asset allocations are indicative and have been set for illustration purposes. They should not be considered as prescriptive of the percentage held in each sector for an actual portfolio of that Defensive/Growth split.

Portfolio Modeling

The first step in modeling the portfolios was to choose indices to simulate the performance of the five sectors. In each case we required a cumulative index with monthly closing values for 1979 to 1999. Where such an index did not exist we created one. The indices selected/created are as follows.

Sector	Index
Cash	The dealers rate for 90-day bank bills. (IRESS)
Bonds	0-3yrs Commonwealth Bonds Accumulation Index (IRESS)
Australian Property	Listed Property Trust Accumulation Index
Australian Shares	All Ordinaries Accumulation Index
International Shares	MSCI World (ex Australia) (A\$)

The second step was to create monthly closing cumulative values for each of the portfolios from weighted sums of the sector indices with the weightings reflecting the asset allocation for that portfolio. So, for example, the closing value of Portfolio 4 comprised

- 20% of the Cash index value, plus
- 30% of the Bonds index value, plus
- 10% of the Australian Property index value, plus
- 25% of the Australian Shares value, plus
- 15% of the International Property index value.

Each portfolio was re-balanced annually. Because the sectors that comprise a portfolio will produce different returns, the proportion of the portfolio held in each sector will, over time, change from that of the original asset allocation. In a professionally managed portfolio, the portfolio will periodically be adjusted back to the benchmarked asset allocations by selling investments in sectors that have over-performed and buying investments in sectors that have under-performed. This process is referred to as re-balancing.

Performance Calculations

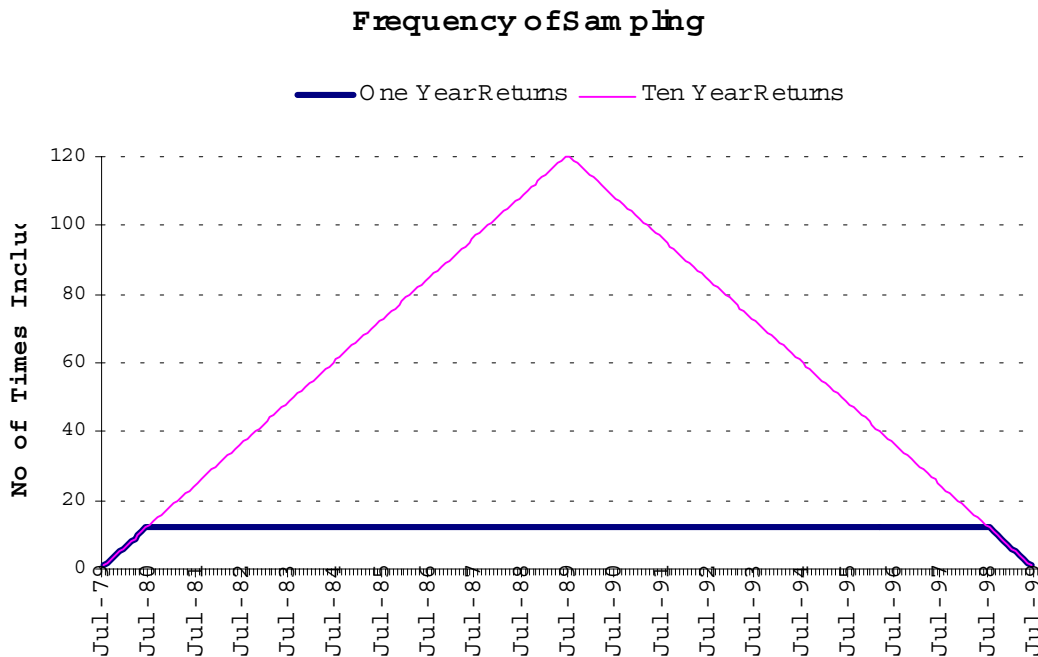
The basic set of calculations comprises monthly, yearly and ten-yearly returns for the five indices and the seven portfolios. Yearly return calculations were done for each of the 229 periods of twelve consecutive months in the twenty years – the first period being July 1979 to June 1980, the second being August 1979 to July 1980, and so

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on. Similarly, ten-yearly return calculations were done for each of the 121 periods of one hundred and twenty consecutive months in the twenty years.

The first advantage of this approach is that yearly and ten-yearly return calculations are not just being done for periods all starting on the same month, be it January or July, and so present a more realistic view of what a consumer may experience. The second advantage is that this approach provides a much larger number of periods to analyse.

However, there is a disadvantage. Because the periods overlap, not all months are equally represented in the one year and ten year periods on which returns are calculated, as shown below.



For yearly return calculations, the inequality is minimal with the virtually all months being used twelve times. However, for ten-yearly return calculations, the inequality is marked. The first and last months are used only once, whereas the middle two months are used 120 times, with the other months falling somewhere in between.

This inequality can cause distortion in the pattern of returns. One such distortion is evident in the comparison of ten year returns for Bonds and Australian Property, as shown below.

	Bonds	Australian Property
Average Monthly Return: 1979 - 1999	0.97	1.18%
Average Yearly Return: 1979 - 1999	12.4%	15.0%
Average Ten Yearly Return: 1979 - 1999	264%	258%
Average Monthly Return: 1988 - 1991	1.21%	0.50%

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As can be seen, Australian Property out-performed Bonds on a monthly and yearly basis (as would be expected) but not on a ten yearly basis. The explanation for this anomaly is that the credit squeeze and property market collapse of the late 80s/early 90s is over-represented in the ten year periods on which the calculations are done.

Readers may also see what appear to be inconsistencies when comparing rates of return for different time periods, e.g. when comparing the average annual return with the annualised average ten yearly return. However, these are examples of the anomalies that can occur with Time Weighted Average Return Rate (TWARR), as shown below.

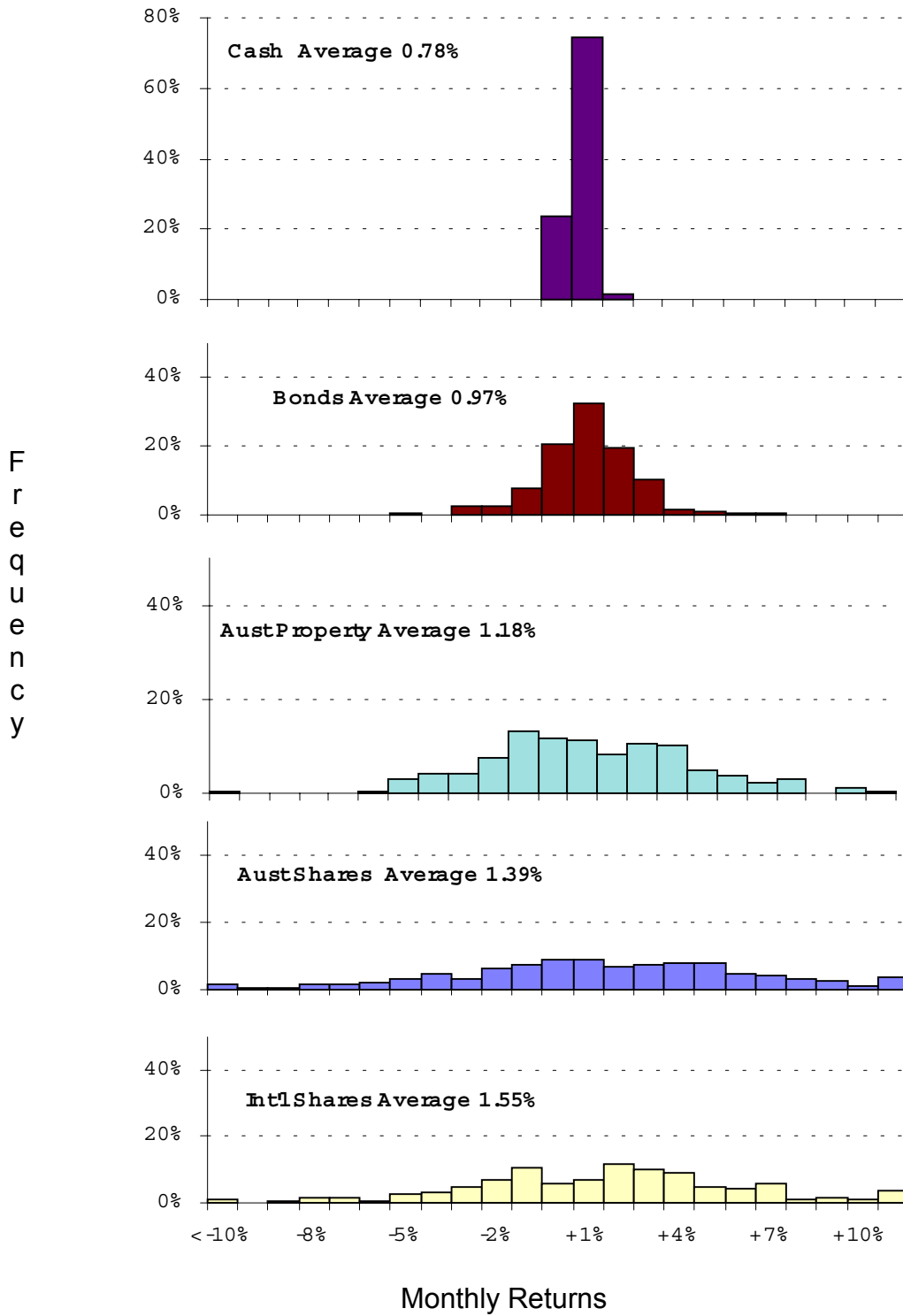
	Case A		Case B	
Amount Invested		\$100		\$100
Year 1 Return	+10%		+100%	
Value of Investment		\$110		\$200
Year 2 Return	+20%		-50%	
Value of Investment		\$132		\$100
TWARR	+15%		+25%	
Annualised Rate of Return		+14.9%		+0.00%

B: Indices Analysis

(To be completed)

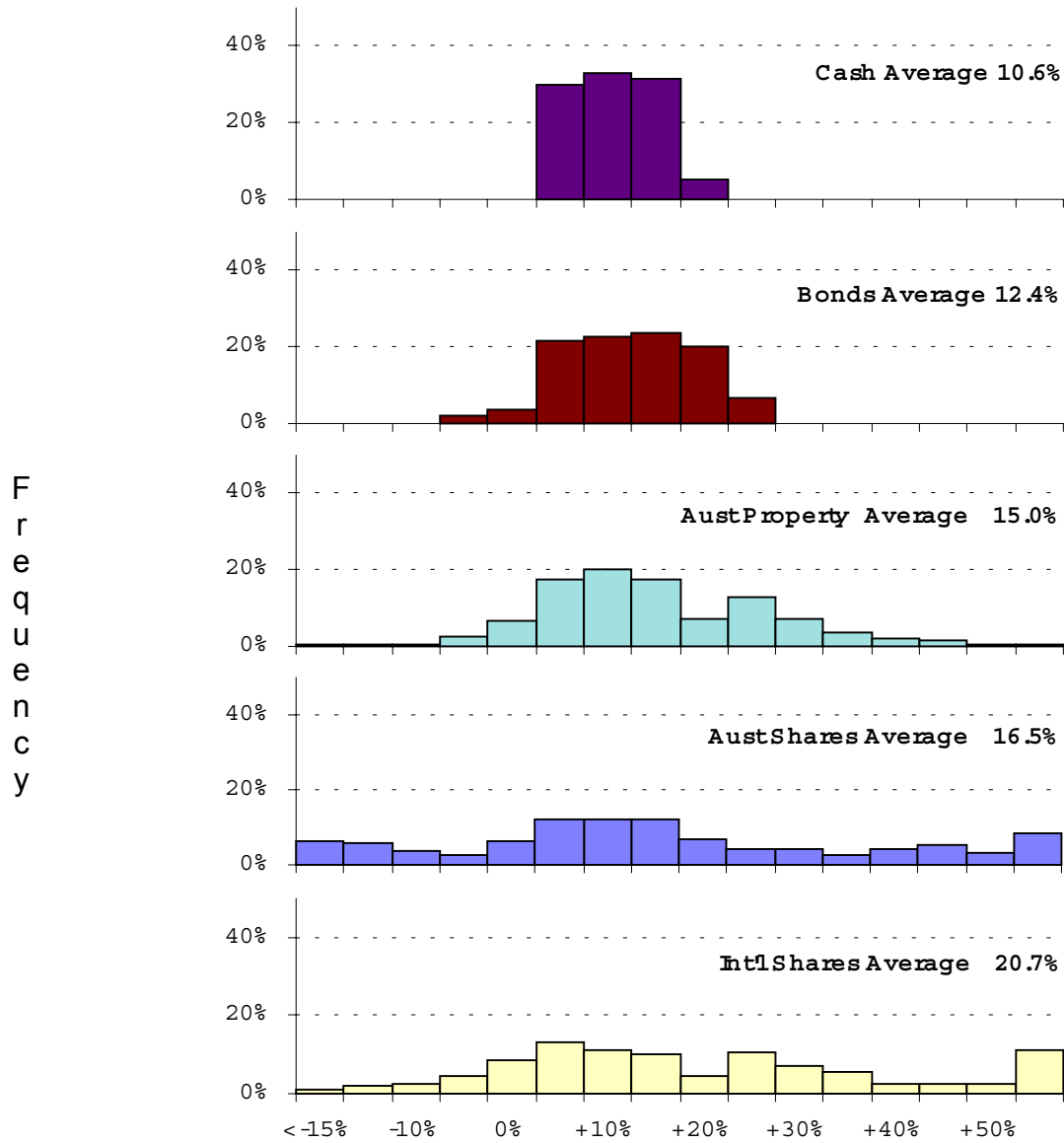
Monthly Index Returns: 1979 - 1999

The chart below shows for each index the distribution of monthly returns for the 240 months in the twenty years from July 1, 1979 to June 30, 1999.



Twelve Monthly Index Returns: 1979 - 1999

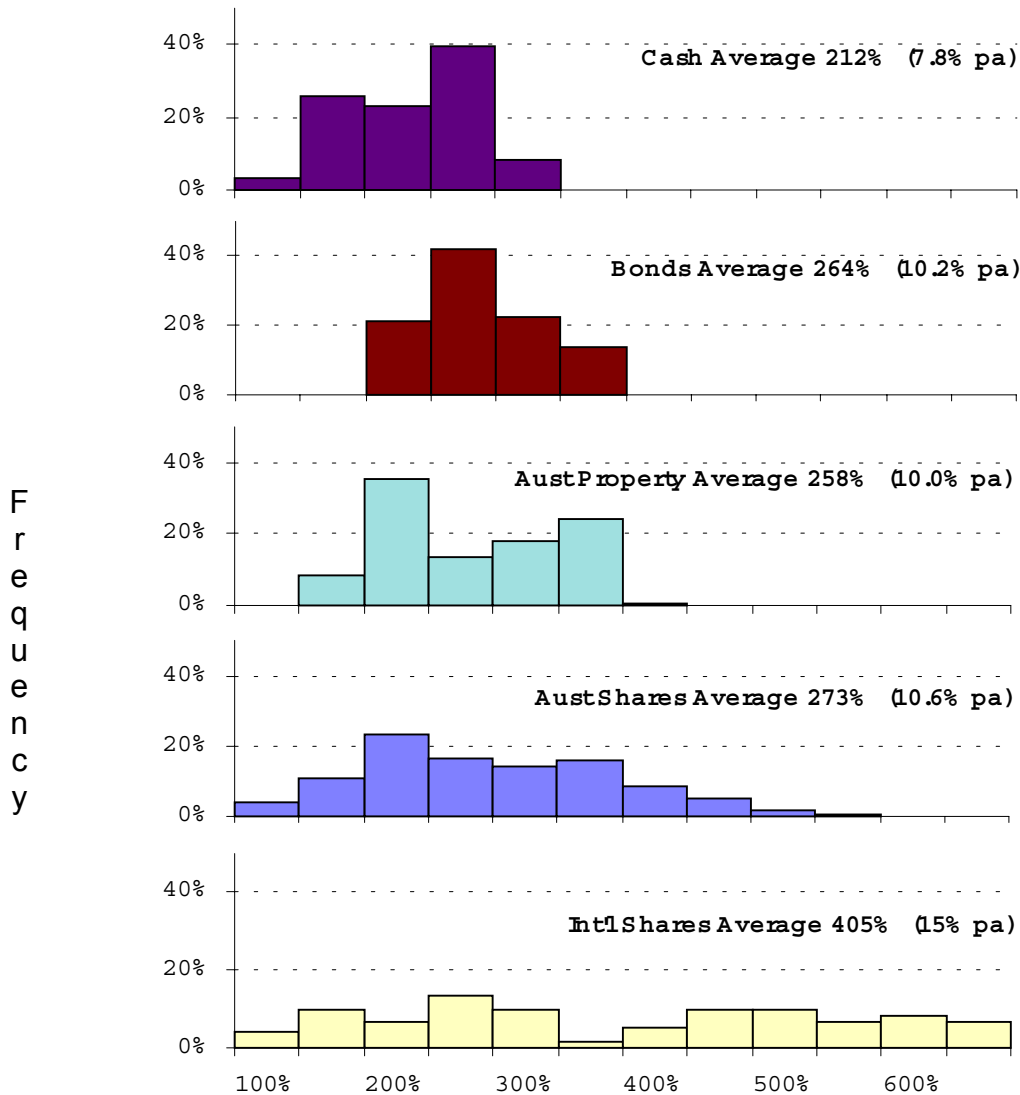
The chart below shows for each index the distribution of cumulative returns for the 229 periods of 12 consecutive months in the twenty years from July 1, 1979 to June 30, 1999. The first period runs July,1 1979 to 30 June 1980, the second runs August 1, 1979 to July 31, 1980 and so on. The last period is July1, 1998 to June 30, 1999.



One-Year Returns (12 Consecutive Months)

Ten Yearly Index Returns: 1979 - 1999

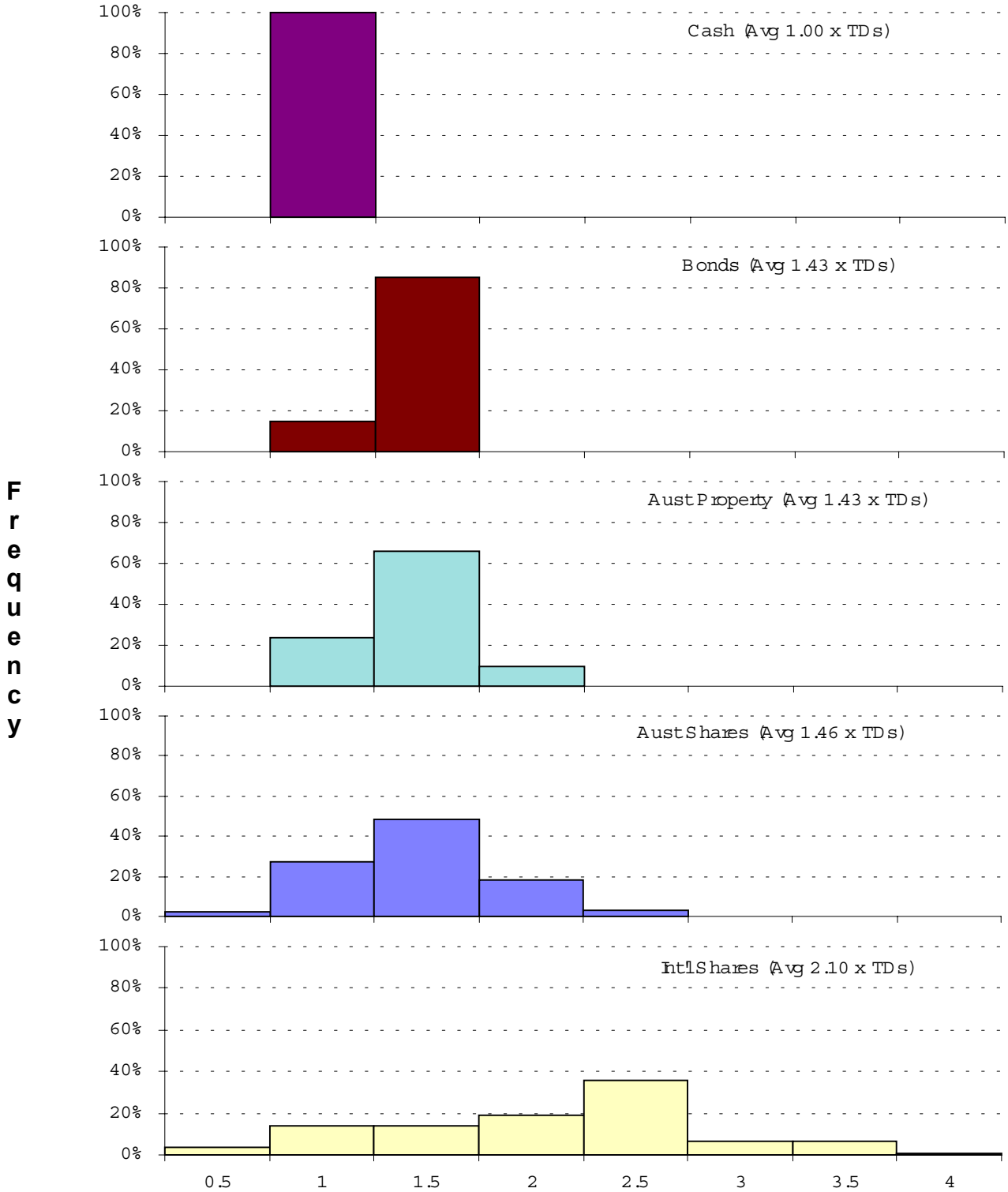
The chart below shows the distribution of returns for the 121 periods of 120 consecutive months in the twenty years from July 1, 1979 to June 30, 1999. The first period runs July, 1 1979 to 30 June 1989, the second runs August 1, 1979 to July 31, 1989 and so on. The last period is July1, 1989 to June 30, 1999.



Ten-Year Returns (120 consecutive months)

**Ten Yearly Index Returns: 1979 – 1999
(Multiples of Term Deposit Rate)**

The chart below shows the distribution of index returns as a multiple of the term deposit rate for the 121 periods of 120 consecutive months in the twenty years.



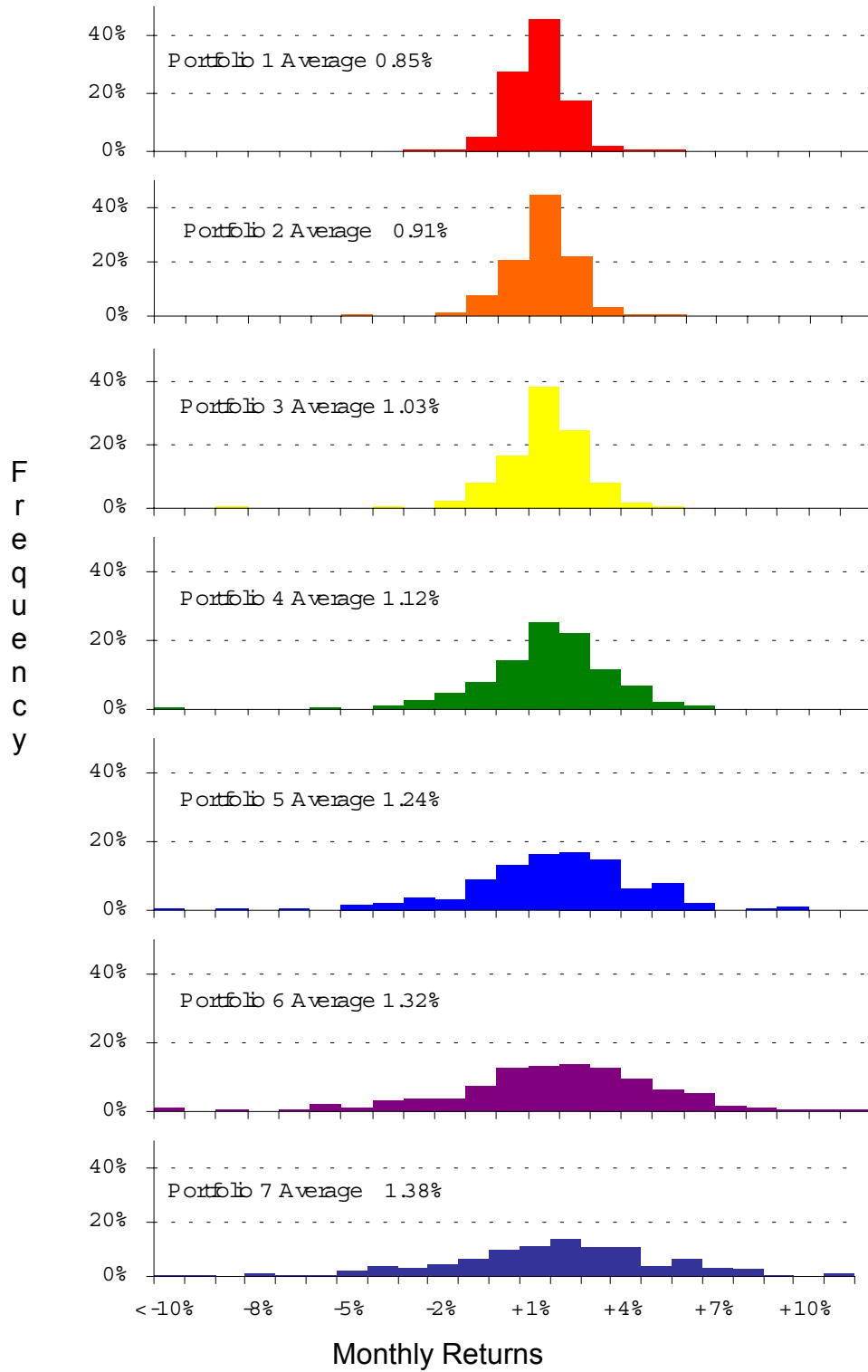
Ten-Year Returns (120 consecutive months) as a multiple of Term Deposit returns

C: Portfolios Analysis

(To be completed)

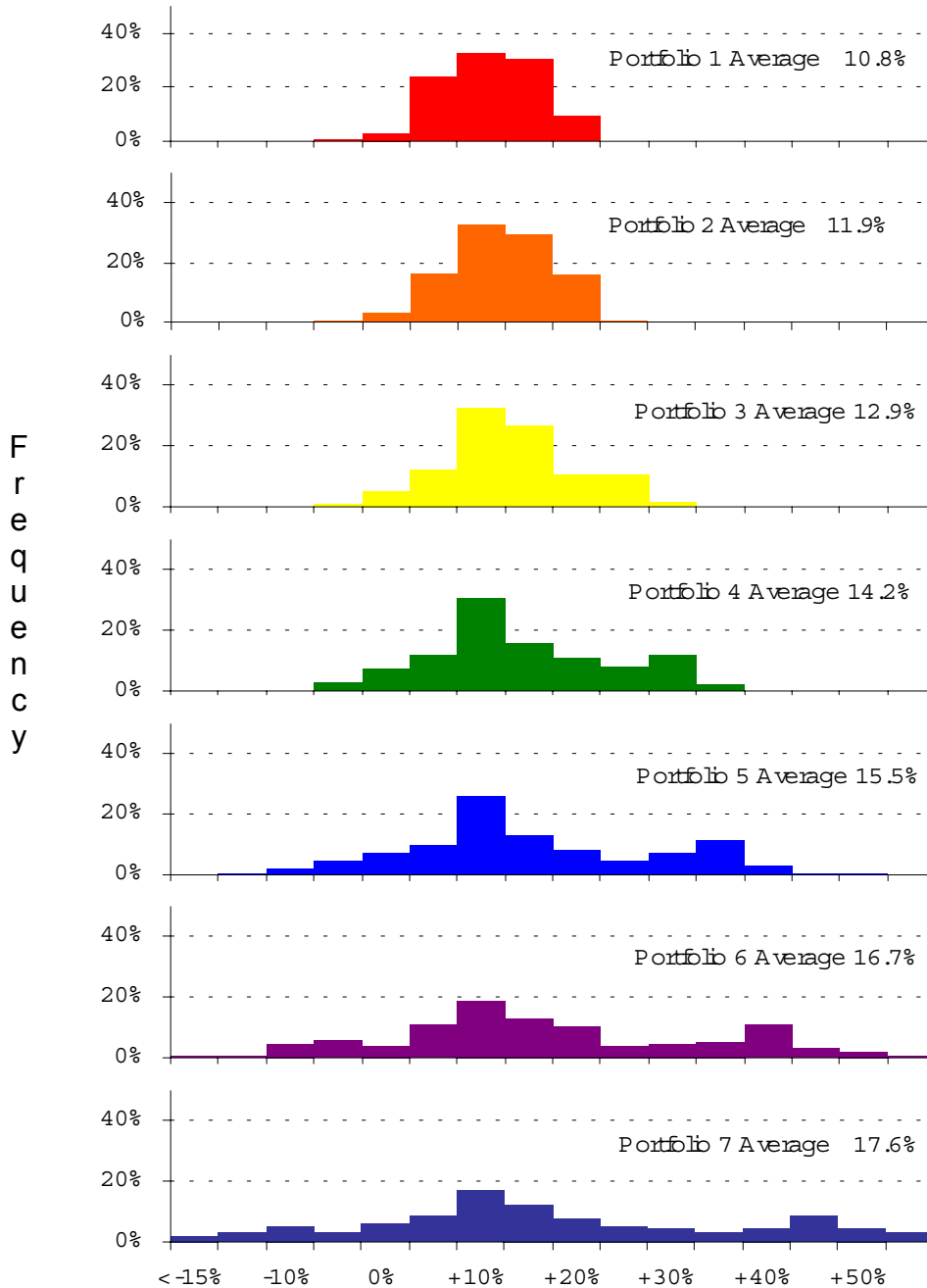
Monthly Portfolio Returns: 1979 - 1999

The chart below shows for each portfolio the distribution of monthly returns for the 240 months in the twenty years from July 1, 1979 to June 30, 1999.



Twelve Monthly Portfolio Returns: 1979 - 1999

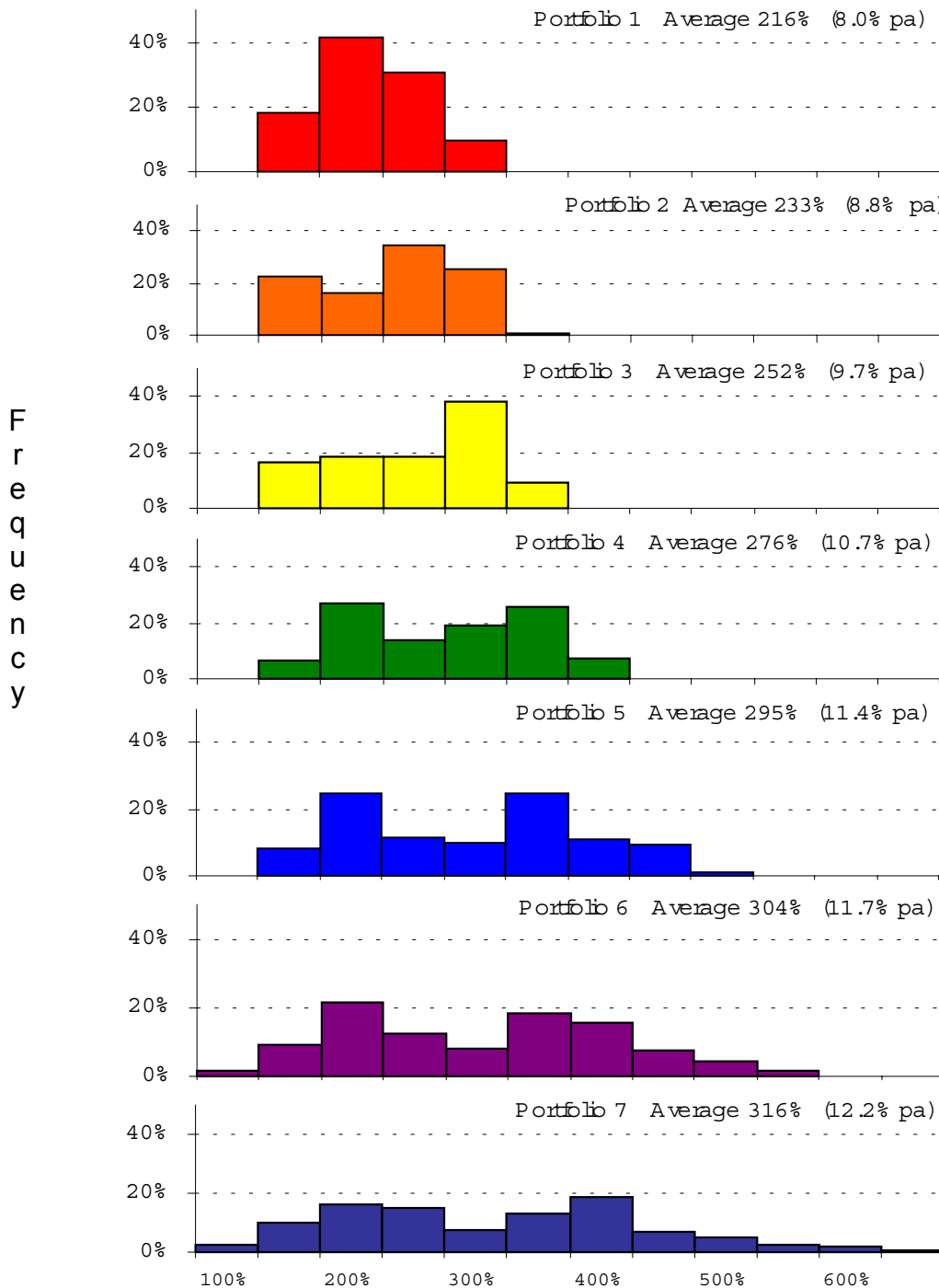
The chart below shows for each portfolio the distribution of cumulative returns for the 229 periods of 12 consecutive months in the twenty years from July 1, 1979 to June 30, 1999. The first period runs July,1 1979 to 30 June 1980, the second runs August 1, 1979 to July 31, 1980 and so on. The last period is July1, 1998 to June 30, 1999.



One Year Return (12 Consecutive Months)

Ten Yearly Portfolio Returns: 1979 - 1999

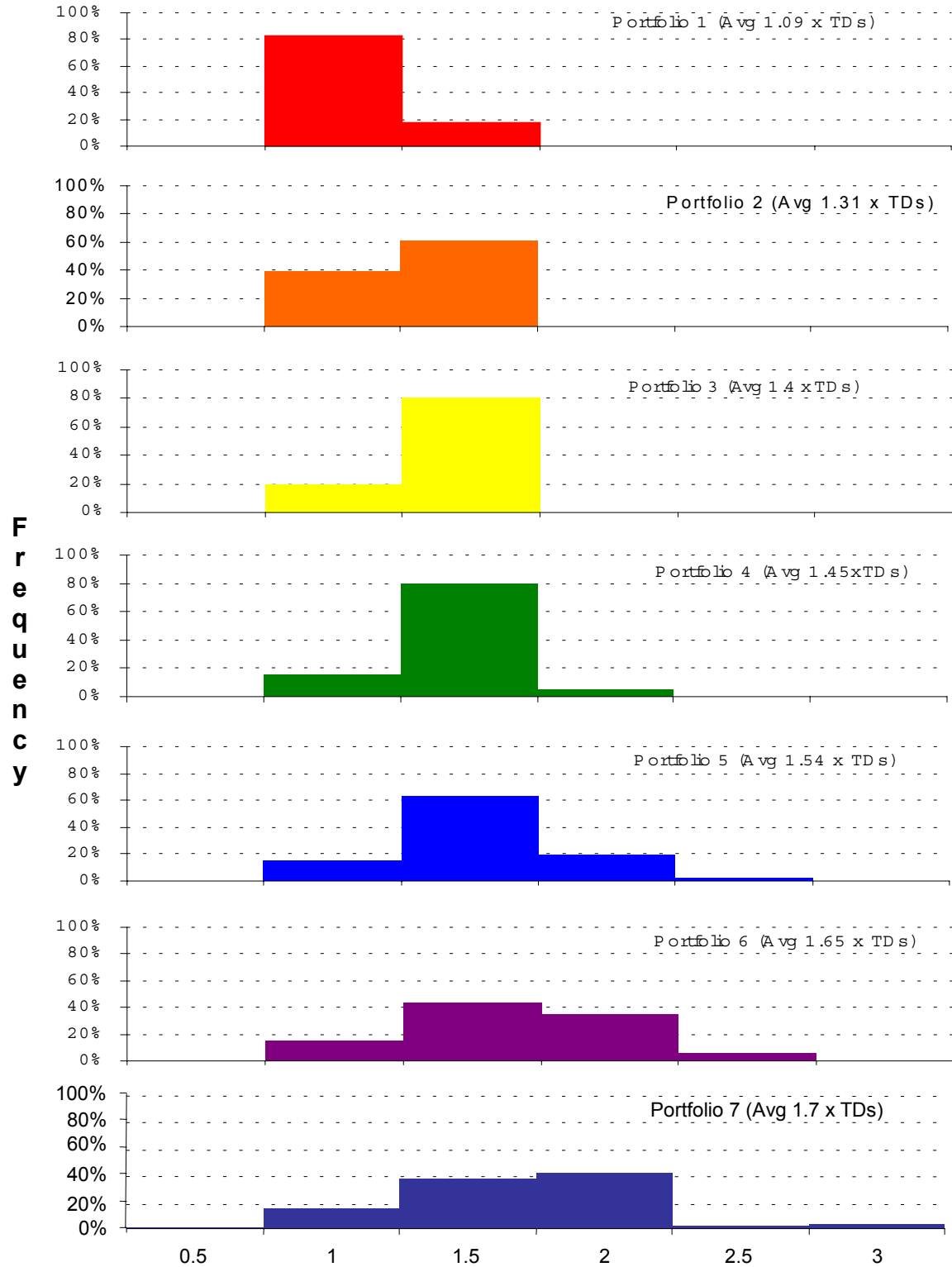
The chart below shows the distribution of returns for the 121 periods of 120 consecutive months in the twenty years from July 1, 1979 to June 30, 1999. The first period runs July,1 1979 to 30 June 1989, the second runs August 1, 1979 to July 31, 1989 and so on. The last period is July1, 1989 to June 30, 1999.



Ten-Year Returns (120 Consecutive Months)

**Ten Yearly Portfolio Returns: 1979 – 1999
(Multiples of Term Deposit Rate)**

The chart below shows the distribution of returns as a multiple of the term deposit rate for the 121 periods of 120 consecutive months in the twenty years.



Ten-Year Returns (120 consecutive months) as a multiple of Term Deposit Returns

D: Risk Group Analysis

(To Be Completed)

Risk Group 1

Risk Group 1 includes risk tolerance scores in the range 0 to 24% and represents 1% of the population.

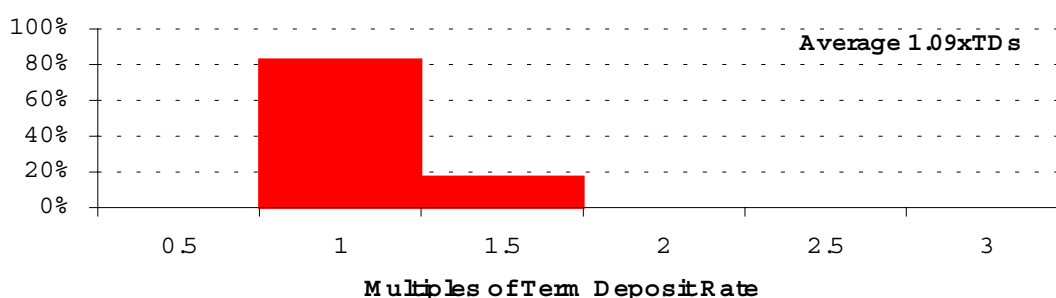
Investment Characteristics

Preferred Portfolio: 100% Low, 0% Medium, 0% High (Portfolio1)⁶

Return Expectations: Ten year return of 1 to 1.5 times term deposit rate.

Sensitivity to Volatility: The investor would begin to feel uncomfortable with any fall in the total value of investments.

Actual 10 year Returns for Portfolio 1 (1979 – 1999)



Actual Volatility of Portfolio 1 (1979 – 1999)

<u>Negative Run (months)</u>	<u>Number of Times</u>	
1	24	There were 27 periods of one month or longer where the value of the portfolio fell before it began to recover.
2	2	
3	0	The largest fall was 4% which lasted five months, and this was the longest negative run.
4-6	1	
7-12	0	
12+	0	
Total	27	

⁶ While the majority of Risk Group 1 prefer Portfolio1, a significant minority prefer Portfolio 2. See Risk Group 2 for Portfolio 2's return and volatility details.

Risk Group 2

Risk Group 2 includes risk tolerance scores in the range 25 to 34 and represents 6% of the population.

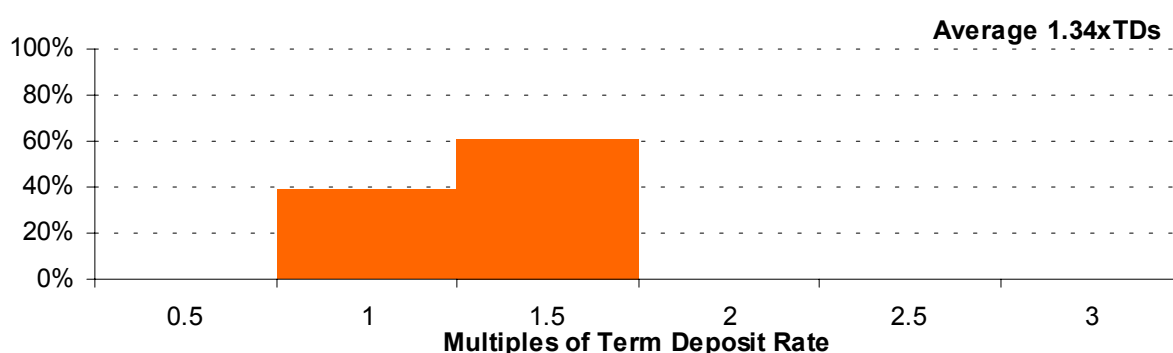
Investment Characteristics

Preferred Portfolio: 70% Low, 30% Medium, 0% High (Portfolio2)

Return Expectations: Ten year return of 1 to 1.5 times term deposit rate.

Sensitivity to Volatility: The investor would begin to feel uncomfortable with any fall in the total value of investments.

Actual 10 year Returns for Portfolio 2 (1979 – 1999)



Actual Volatility of Portfolio 2 (1979 – 1999)

<u>Negative Run (months)</u>	<u>Number of Times</u>	
1	20	There were 26 periods of one month or longer where the value of the portfolio fell before it began to recover.
2	5	
3	0	The largest fall was 5% which lasted two months.
4-6	0	
7-12	1	The longest negative run lasted eleven months during which the value of the portfolio fell by 4%.
12+	0	
Total	26	

Risk Group 3

Risk Group 3 includes risk tolerance scores in the range 35 to 44 and represents 38% of the population.

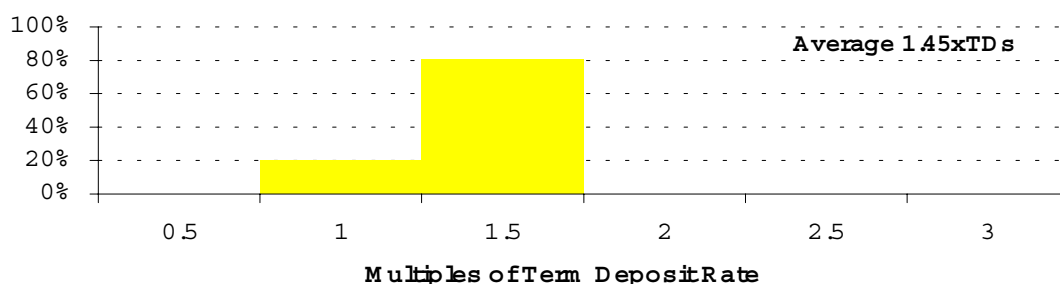
Investment Characteristics

Preferred Portfolio: 50% Low, 40% Medium, 10% High (Portfolio 3)

Return Expectations: Ten year return of 1.5 to 2 times term deposit rate.

Sensitivity to Volatility: Total value of investments could fall by 10% before the investor would begin to feel uncomfortable.

Actual 10 year Returns for Portfolio 3 (1979 – 1999)



Actual Volatility Portfolio 3 (1979 – 1999)

<u>Negative Run (months)</u>	<u>Number of Times</u>	
1	18	There were 26 periods of one month or longer where the value of the portfolio fell before it began to recover.
2	5	
3	0	The largest fall was 9% which lasted one month.
4-6	2	
7-12	1	The longest negative run lasted 10 months during which the value of the portfolio fell by 5%.
12+	0	
Total	26	

Risk Group 4

Risk Group 4 includes risk tolerance scores in the range 45 to 54 and represents 38% of the population.

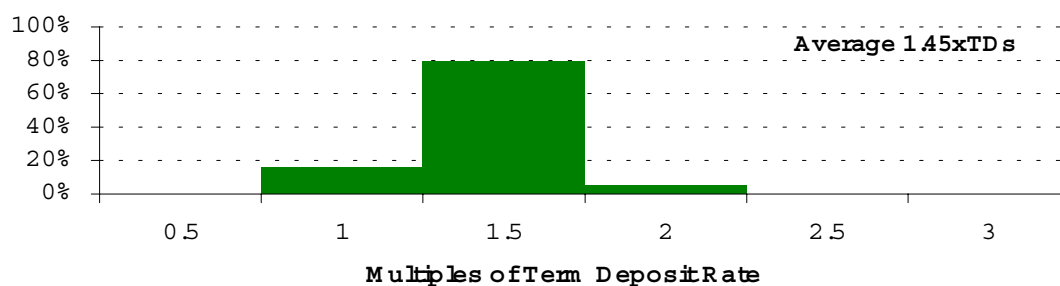
Investment Characteristics

Preferred Portfolio: 30% Low, 40% Medium, 30% High (Portfolio 4)

Return Expectations: Ten year return of 1.5 to 2 times term deposit rate.

Sensitivity to Volatility: Total value of investments could fall by 20% before the investor would begin to feel uncomfortable.

Actual 10 year Returns for Portfolio 4 (1979 – 1999)



Actual Volatility of Portfolio 4 (1979 – 1999)

<u>Negative Run (months)</u>	<u>Number of Times</u>	
1	26	There were 35 periods of one month or longer where the value of the portfolio fell before it began to recover.
2	4	
3	2	The largest fall was 16% which lasted one month.
4-6	2	
7-12	1	The longest negative run lasted 10 months during which the value of the portfolio fell by 7%.
12+	0	
Total	35	

Risk Group 5

Risk Group 5 includes risk tolerance scores in the range 55 to 64 and represents 24% of the population.

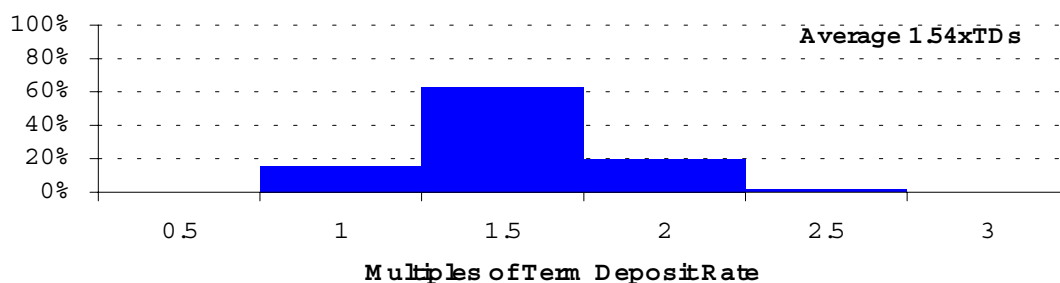
Investment Characteristics

Preferred Portfolio: 10% Low, 40% Medium, 50% High (Portfolio5)

Return Expectations: Ten year return of 2 to 2.5 times term deposit rate.

Sensitivity to Volatility: Total value of investments could fall by 20% before the investor would begin to feel uncomfortable.

Actual 10 year Returns for Portfolio 5 (1979 – 1999)



Actual Volatility of Portfolio 5 (1979 – 1999)

<u>Negative Run (months)</u>	<u>Number of Times</u>	
1	28	There were 38 periods of one month or longer where the value of the portfolio fell before it began to recover.
2	4	
3	3	The largest fall was 23% which lasted one month.
4-6	2	
7-12	1	The longest negative run lasted twelve months during which the value of the portfolio fell by 10%.
12+	0	
Total	38	

Risk Group 6

Risk Group 6 includes risk tolerance scores in the range 65 to 74 and represents 6% of the population.

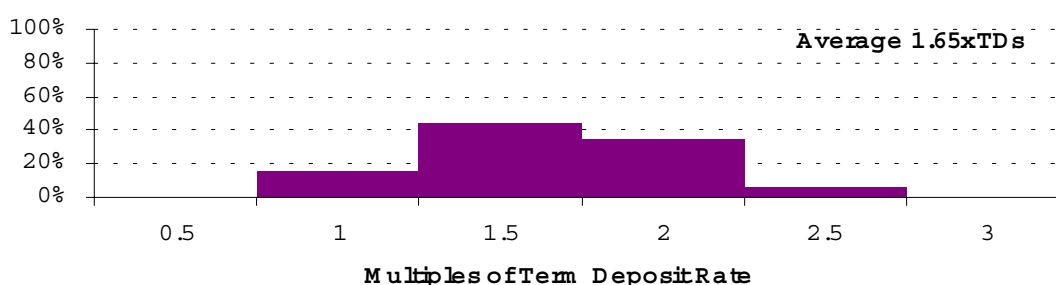
Investment Characteristics

Preferred Portfolio: 0% Low, 30% Medium, 70% High (Portfolio 6)

Return Expectations: Ten year return of at least 3 times term deposit rate.

Sensitivity to Volatility: Total value of investments could fall by 33% before the investor would begin to feel uncomfortable.

Actual 10 year Returns for Portfolio 6 (1979 – 1999)



Actual Volatility of Portfolio 6 (1979 – 1999)

<u>Negative Run (months)</u>	<u>Number of Times</u>	
1	26	There were 41 periods of one month or longer where the value of the portfolio fell before it began to recover.
2	7	
3	5	The largest fall was 28% which lasted two months.
4-6	2	
7-12	1	The longest negative run lasted twelve months during which the value of the portfolio fell by 12%.
12+	0	
Total	41	

Risk Group 7

Risk Group 7 includes risk tolerance scores in the range 75 to 100 and represents 1% of the population.

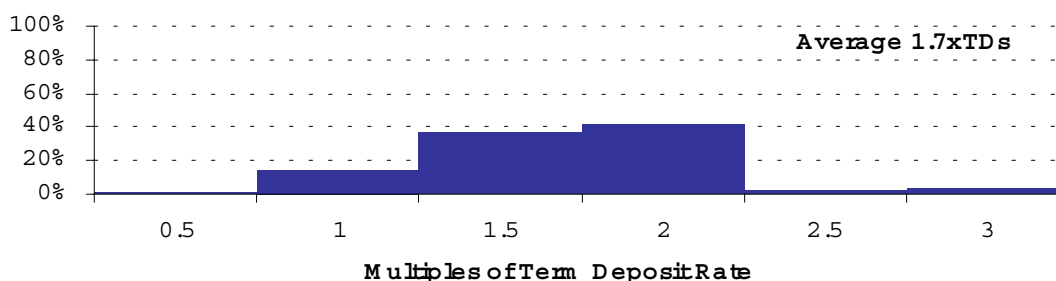
Investment Characteristics

Preferred Portfolio: 0% Low, 0% Medium, 100% High (Portfolio7)

Return Expectations: Ten year return of more than 3 times term deposit rate.

Sensitivity to Volatility: Total value of investments could fall by 50% before the investor would begin to feel uncomfortable.

Actual 10 year Returns for Portfolio 7 (1979 – 1999)



Actual Volatility of Portfolio 7 (1979 – 1999)

<u>Negative Period (months)</u>	<u>Number of Times</u>
1	28
2	5
3	7
4-6	3
7-12	1
12+	0
Total	44

There were 44 periods of one month or longer where the value of the portfolio fell before it began to recover.

The largest fall was 33% which lasted four months.

The longest negative run lasted twelve months during which the value of the portfolio fell by 15%.

E: “What If?” Comparisons

(To Be Completed)