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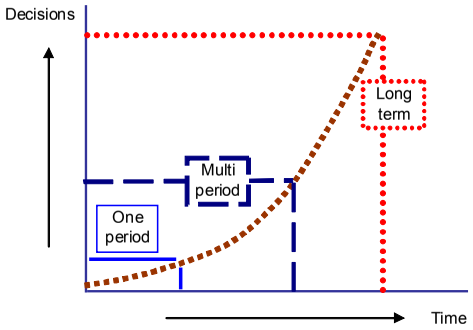
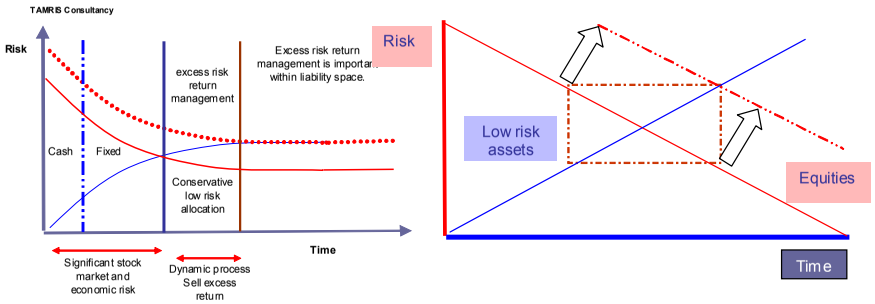
TAMRIS CONSULTANCY

The Portfolio Problem
&
Portfolio Optimisation in Liability Space





In the problem lies the solution, in the solution the problem.

CONTENTS

INTRODUCTION

The portfolio problem lies in the ability to deliver asset management expertise efficiently and productively in the presence of personalisation.

> Every client's existing assets, financial needs and risk preferences are different.

The biggest component of personalisation is the construction, planning and management of assets relative to the client's inflows to and outflows from the portfolio over time. This document deals in large part with this component of personalisation and TAMRIS solutions to the problem.

The other two major components of personalisation and the portfolio problem include the ability to manage hundreds of diverse segregated personal equity portfolios and the ability to relate all portfolio decisions and relationships as markets, relative prices and asset/liability relationships change.

The TAMRIS technical documents discuss the individual aspects of each of the components of the solution and the problem. This document introduces the problem as a portfolio problem to set the context of the management of assets within a liability management framework. This is an investment led solution and one which can only be delivered by investment expertise.

PORTFOLIO OPTIMISATION IN LIABILITY SPACE

This document defines the portfolio problem in liability space and proposes a solution for the management of assets within liability space.

In fact, we will show that the portfolio universe and the rules defining it can be found in the simple relationship between, cash, fixed interest and equity investments over time. In fact, all assets are related to the return on equity capital over time. It is this simple fact which allows us to construct the universe, its boundaries and to define the rules for the management of assets and liabilities over time.

By defining the boundaries we can therefore determine the rules governing portfolio structure in the presence of liabilities over time and directly relate risk aversion, liabilities and performance preferences to portfolio construction, planning and management.

If we know the boundaries and the rules, we can then automate the personalisation of portfolio structure to meet liabilities for the universe of yield requirements, risk aversion, investment style and performance preferences.

RISK RETURN & LIABILITY SPACE

In general asset managers operate in risk/return space and focus on the management of risk and return at a point in time. Individuals live in liability space and need their assets to meet their needs not just at point in time but over time.

The portfolio problem is that of constructing, planning and managing assets to meet needs over time, given that risk and return at a point in time and, over time need to be managed at the same time.

Asset management, the management of risk and return at a point in time, is extremely well developed. In fact, all the major techniques for the research, selection and management of stocks are well established. The management of assets within liability space is not developed. There is no one accepted methodology for structuring assets to meet liabilities over time.

The reason for this is that the boundaries of the universe of asset and liability management and the rules defining their relationship are universally neither known nor have they been formally accepted.

PORTFOLIO PROBLEM

How do we construct, plan and manage the relationship between assets and liabilities over time?

How do we optimise the allocation of resources between investment research and strategy and client portfolio management?

Research and strategy should be focussed on the management of excess risk and return at a point in time and on applying efficient selection of securities and markets (allocation) to portfolios in general. It is not efficient to have to focus on risk/return allocation, strategy and security selection at the same time as multiple portfolio objectives.

THE ONE PERIOD PROBLEM

If we were only looking at simple objectives over short periods of time, for example a year, the portfolio problem is much simpler. In this context, we are only looking at the relationship between asset allocation risk/return and simple liability objectives.

Within modern portfolio theory, the risk/return equation is one which looks at the most efficient combination of assets to meet the client's return objectives, return being synonymous with both liabilities and performance. Because the point in time liability is more often than not small relative to the overall portfolio, the rationale of the risk/return relationship in liability space is not stretched. We do not need to look at longer term issues within portfolio construction.

Within the traditional portfolio context, that is where the portfolio is structured so that income is met by interest and dividend yield, this is also not a problem. We are only looking at one period and any capital expenditure is easily accommodated. There is a risk/return rationale and objectives are met.

The one period problem is not a problem. But, is the consideration of the portfolio problem within a one period context a problem?

THE MULTIPLE PERIOD PROBLEM

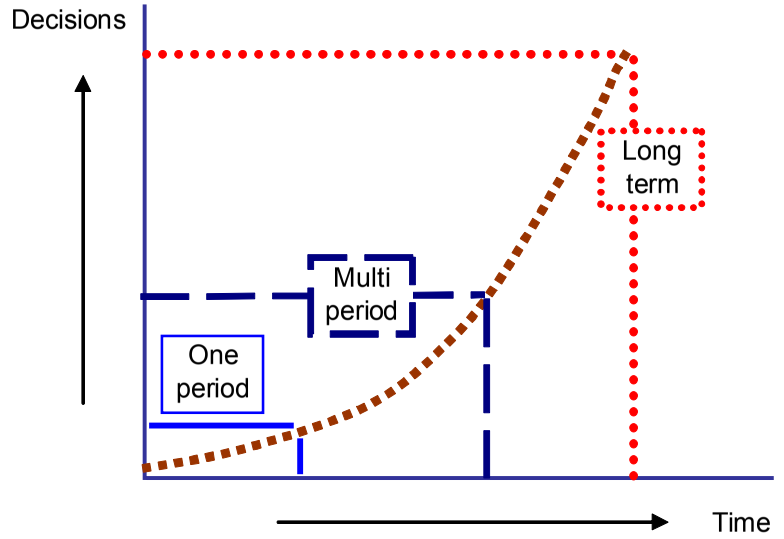
It gets more complicated once we start to increase the time horizon since the size and timing of income and capital inflows to and from the portfolio become more complex.

In the context of modern portfolio theory, liabilities are not an input into portfolio structure. At this point the limitations of the MVO structure are well apparent. All that can be done to reflect liabilities is to determine the average return needed by the client's financial needs and use this to structure the portfolio. However, the return profile is only an average and provides no information regarding the size and timing of income and capital needs. The limitations of MVO in an asset liability modelling and management context are discussed in TAMRIS: Asset Liability Modelling and in the word document a New Foundation.

In the traditional approach, it is impossible to incorporate all this change into portfolio structure. The portfolio will be moving in all directions if you attempt to do so. There are frankly too many variables. What the traditional approach will do is to have a limited time horizon, say a three year horizon where the portfolio is structured to meet the yield/growth objective and known liabilities are planned for. As needs change and liabilities enter the equation the portfolio manager has to react and make changes within this 3 year window. This may be a manageable situation, but is it the optimal situation?

THE LONG TERM PROBLEM

Not only does the complexity of the relationship between asset allocation and liability profiles increase over the very long term, but we are faced with a number of other decisions that we were not faced with in the single and multi period problems.



- What is the effect of asset allocation and liabilities on the ability of assets to meet needs over time?
- Will the client's asset last?
- Is the current income level appropriate?

In this context we also find that we may need to understand the disposition of all current and future assets and, all current and future financial needs.

We then start to have to assess the effect of current demands on the ability of assets to meet needs over time.

The portfolio problem mutates into a short and long term optimisation problem. It would appear that trying to solve all these problems is actually making the portfolio problem ever more complex. This is one reason why it is generally not managed and why the asset manager will hand over this responsibility to the financial planner.

There is a solution

However, there is a solution. In fact, the portfolio problem forces us to assess the longer term nature of assets and asset risks and, liabilities and liability risks and the relationship between the two.

Traditional solutions

If we look at the traditional method of structuring portfolios within a limited 1 to 3 year multi-period, it is clear that this may not be an efficient allocation of assets.

If too much of the income need is met from interest and dividends, the greater the long term allocation to assets exposed to inflationary risk and limited opportunity for capital appreciation. If only part of total liabilities is met from income, then capital will need to be transferred from equities to expenditure. If this transfer is not managed and planned for in advance and, if there is not a structure to manage this risk, it can actually increase risk, reduce return, incur additional transaction charges and place long term financial security at risk.

> In fact we need to minimise risk to realisation of equities, plan in advanced of the need, reduce portfolio transaction costs and wherever possible manage the realisation of excess return.

One of the traditional solutions within portfolio management is to limit the range of income that can be supported from a portfolio to one which will reduce the risks of capital depletion. Unfortunately, this does not optimise the consumption of capital. People do not save capital only to have their options limited to drawing interest. In particular, retired investors often need the higher expenditure up front and will often reduce expenditure later on in retirement. This requires an asset and a liability optimisation process.

Modern portfolio theory

Modern portfolio theory lacks the liability component needed to plan and manage structure and cannot manage short term risk and return. It only has a rational within the one period model – see TAMRIS Technical documents and a New Foundation for further information.

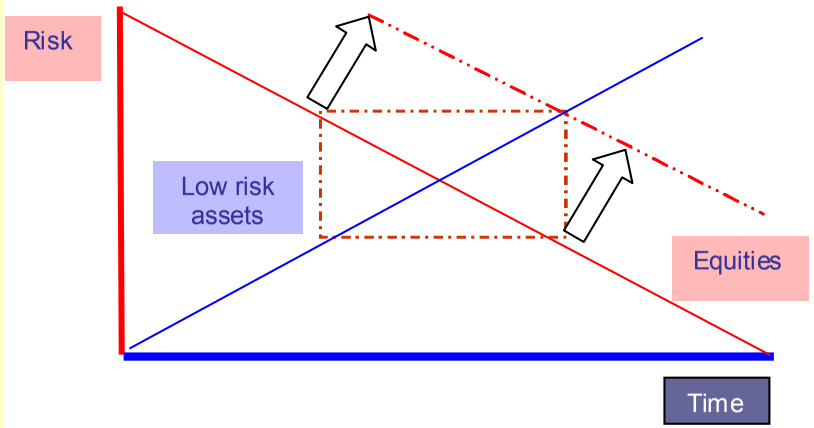
THE PORTFOLIO SOLUTION

To solve the asset and liability management over time dilemma, we need to revisit the fundamental nature of asset risk and return over time.

From this analysis we can derive basic rules that determine the relationship between assets and liabilities over time and a framework for its management.

The fundamental nature of assets

- Cash and fixed interest returns are components of the return on equity. Over the long term, they are exposed to the same economic risks. Long term holdings of low risk assets do not diversify natural risk.
- Over the long term, nominal lower risk assets are exposed to greater risks than equities because of inflation.
- Over the short term equities are higher risk investments because they are exposed to stock market (valuation risks) and short term economic risks. Over the short term, lower risk assets provide greater income and capital security.
- Over time the risk of equity investment relative to the risk of low risk investment falls and the risk of low risk investment relative to equities rises. At some point in time low risk assets become higher risk assets than equities. This time frame is referred to by TAMRIS as the period of “significant short term stock market and economic risk” and is key to defining the optimal long term asset and liability allocation. See graph overleaf.



The red line (above graph) shows the relative risk on equities falling over time, the solid blue, the relative risk on low risk assets over time. The dashed red line shows that the actual time frame is affected by both valuation and economic risks and that the period of risk shifts and the box the management of allocation in response to excess valuation and economic risk.

Fundamental rules

Because of the fundamental nature of assets over time, in the presence of inflationary risk and the absence of risk aversion, for a given liability profile over time there is an optimal allocation to cash, fixed interest and equities. The basic structural rules for the management of assets within a liability management framework are therefore as follows.

- Outside of risk aversion and excess valuation risk, the only rationale for lower risk assets is to provide short term security of capital and income needed to meet liabilities in the event of significant short term stock market and economic risk.
- In the absence of liabilities equities are the most efficient long term asset class.
- The amount of low risk assets held within a portfolio is directly related to the amount of liabilities a client has arising over the designated period of "significant short term stock market and economic risk", or the short term continuum[i].
- Longer term assets (equities) are held within the time frame over which they are most efficient, while low risk short term assets are allocated to where they are most efficient. The allocation at the margin is managed in accordance with fundamental management of excess risk and return.

The structure provides a defensive box in which income and capital security can be maintained while the management of excess risk and return can be used to enhance return and risk management over time at the margin within a time frame which does not expose the portfolio or liabilities to excessive risk.

Significant stock market and economic risk

Just what is the period of significant stock market and economic risk and how do we manage it?

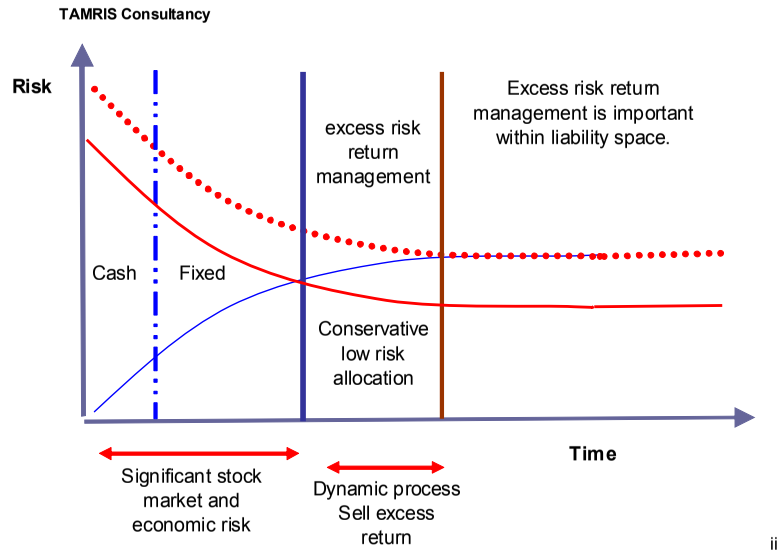
The objective of the short term component is to protect income and capital needs in the event of significant risk and to defer equity sales during periods of low valuation and low market risk, while forcing sale of excess return at high to extreme market valuations. In other words it is the management of the structure that is most important and this is an investment discipline.

If we look at historical analysis of market risk and return we can define the nature and time frame of historical risk. Actual management of significant risk will depend on the market valuation and underlying economic/earnings cycle.

For example, it took 8 years for the total return on the UK stock market to beat the total return on cash following the onset of the 1973 bear market. If we were to ensure that at all times there is sufficient low risk allocation to protect client liabilities and, to defer forced realisations of equity investments, in the event of this level of risk at fair market/economic valuations, a portfolio would be efficiently allocated between short and long term assets in accordance with short and long term financial needs and in accordance with each asset class's short and long term risk/return profile.

This is an optimisation process, not of the traditional dedicated low risk asset liability modelling kind, but one which incorporates both low risk and equity portfolios in the optimisation process. See TAMRIS; Asset Liability Modelling for further information regarding the mechanics and detail.

During periods of excess market risk and return, the period of cover will need to be pushed forward, as excess return and risk is sold at the margin. See the following chart.



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Let us assume that the period of significant market and economic risk is the cover we need to have within the portfolio as a basic minimum. As markets move into excess risk and return (advanced economic and market cycles), this level of cover is increased. What is in fact happening is that excess return and risk are being sold and transferred to future consumption. This type of exercise can only be effected in association with asset management valuation and economic analysis. It is also importantly not a timing exercise, since this is capital that is earmarked for consumption.

Importantly, this process also defines the importance of diversification within the portfolio risk/return management process. Diversification in this context is a return management platform, risk management being a consequence of diversification as opposed to a primary objective. The less diversification the fewer opportunities for excess/risk return management at all stages of the portfolio life cycle. The actual return management structure that liability management frameworks provide can also significantly enhance long term return.

NAIVE SOLUTIONS

This process should not be confused with simple compound interest/capital withdrawal modelling exercises or indeed the complex asset liability modelling carried out on behalf of institutional pension funds[iii].

Indeed, there are a number of naïve "year of cover" models in the market place, but these lack a construction, planning and management methodology and are more often than not separated form the necessary asset management expertise. In fact, year of cover models with regular annual withdrawals from equities, irrespective of market conditions expose investors to the same risk profile as a 100% equity portfolio. Such solutions are dangerous and are a symptom of the separation of asset and liability management over long time horizons.

Why investment expertise is only needed to manage the short end of the portfolio problem and why the longer end of the portfolio problem can be managed by those without does not make sense. It is a portfolio construction, planning and management and hence investment problem.

The process should also not be confused with simple rebalancing methodologies which have no liability relationship and which use inefficient return management techniques. Note the 50%/50% solution which sells equities as the market rises and buys equities as the market falls; at all times bringing the balance back to the 50%/50% split. This exposes the client to the risk of return contamination.

There is also no magic long term split that applies to all clients over time. Many of these naïve solutions have developed because of the grey area that exists between the portfolio solution/portfolio problem and the long term portfolio problem.

Within liability space, an efficient portfolio is one which can distribute capital for the smallest amount of liquidity risk while optimising asset class risk and return over time.

BENEFITS OF THE PORTFOLIO SOLUTION

The solution to the problem of portfolio personalisation and the delivery of personalised asset management solutions is provided by the liability management framework. It is called a liability management framework because it allows point in time asset management to be run concurrently with long term liability management, while managing the complexities of portfolio personalisation.

Low risk personalisation and automation

Because the low risk portfolio allocation is related to liabilities arising during the period of significant stock market and economic risk we can personalise low risk allocation and security selection in both risk/return and liability space from one central low risk management interface.

Additionally because there is also a natural relationship between risk aversion and increased low risk allocation, the relationship between risk aversion and portfolio structure and the management of structure can also be automated and centrally run.

Short term asset liability modelling & management

The short term asset and liability modelling and management engine manages all the complex interactions of portfolio inflows and outflows over time allowing asset management to focus on point in time risk/return relationships.

Portfolios are also able to anticipate change, adjust to change and remain appropriate as things change.

Equity portfolio management

The short term asset and liability modelling and management engine interacting with low risk security selection also determines the optimum equity allocation.

Importantly, because the liability management framework manages the variance in liabilities over time, equity portfolio strategy can be directed towards managing stable longer term average yield/liquidity/return objectives without having to constantly readjust to unknown short term changes in net financial requirements.

Liability management frameworks also provide a foundation on which segregated equity portfolio management can be managed and organised centrally. The concept of personalised benchmarks for the centralised management of segregated portfolios is critical to the ability to manage personalisation at the equity level within liability space.

Dynamic structure

If the valuation models are directly related to the portfolio construction and planning, and the portfolio construction, planning and management directly related to liabilities, then for any given change in relative asset prices, liability management frameworks automatically manage and adjust as things change.

One of the major problems with managing personalisation used to be that every time there was a significant market change, you had to reassess strategy and then go through each portfolio and reassess relationships. Asset and liability management frameworks naturally manage this change, reducing the complexity of the management process.

Risk assessment

With liabilities and liability risk at the heart of the portfolio construction process, investors can properly assess their attitudes to the risks that affect their financial security as well as return objectives.

Total asset, life cycle wealth management

Within the constrained portfolio solution to the problem of managing assets and liabilities over time, asset management stopped short of long term planning. In fact, long term asset liability modelling and management lies at the heart of asset management services. Total Asset Life Cycle Wealth Management is the logical conclusion of the solution to the portfolio problem and the final integration of the management of assets and the management of liabilities.

The ability to integrate all business process components into one central service process has ramifications for cost, service, asset management distribution and the future structure of the financial services market place.

FUNDAMENTAL REQUIREMENTS OF THE STRUCTURE

The management of assets within liability space requires a different way of modelling and managing the relationship between assets and liabilities over time. Conventional asset liability modelling and management and the assumptions which underpin them are inappropriate for the management of personal financial wealth over time.

The relationship between assets and liabilities also changes the way in which risk is assessed and the way in which risk aversion affects portfolio structure.

The short/long structure which optimises the allocation of assets over time to liabilities over time also requires a focus on both relative valuation and absolute valuation risks which drive the management of excess risk and return at the margin of short and long term risk.

CONCLUSION

The integration of the management of assets and the management of liabilities over time is in fact the solution to the portfolio problem. Once this problem is solved, asset management services will naturally progress into the management of lifetime financial needs.

As stated, portfolio management used to stop at the level of complexity it could handle within its resources and the time constraints of managing personalised portfolios. With these constraints lifted, the portfolio problem can be solved, optimised and enhanced.

The TAMRIS technical documents discuss all the issues and technical expertise associated with the management of assets within a liability management framework. For asset managers, it is important to understand the portfolio problem before the rest of the relationships make sense.

[i] The long term is a short term continuum meaning that we all live in the short term and portfolio structure needs to be managed relative to this dynamic process.

[ii] Note that the more conservative client will require progressively more short term security and will not want to rely on the management of excess risk and return for their short term security.

[iii] For further information on asset liability modelling and management see TAMRIS; Asset Liability Modelling.