

HYPOTHESIS: RISK, LIKE MASS AND ENERGY, CAN NEITHER BE CREATED NOR DESTROYED. DISCUSS

[submitted 27 February 2017]

Dr Quintin Rayer, Chartered FCSI, Chartered Wealth Manager, DPhil, SIPC, head of research, P1 Investment Management

quintinrayer@p1-im.co.uk

Will Dickson, Chartered MCSI, Chartered Wealth Manager, BSc (Hons), MSc, head of portfolio management, P1 Investment Management

willdickson@p1-im.co.uk

ABSTRACT

The authors imagine the title as an essay question in a final financial examination and use this as a stepping stone to look at issues surrounding risk in financial products, the forms risk may take, and the difference between perceptions of risk and reality. Questions are also raised about the impressions of risk levels that may be conveyed to clients by advisers and wealth managers.

INTRODUCTION

We start with a deliberately provocative statement in the form of a hypothesis, potentially to be disproven, but to provide a focus for clarifying awareness of the risks inherent in financial products. Thus to slightly expand the title of this article:

Hypothesis: for a given level of expected return, risk cannot be created or destroyed, it can only change form, unless a financial asset is bought or sold.

Readers may readily object on the basis that they can quickly see ways of creating or extinguishing risk – and we agree. Other methods of transferring risk include the use of derivatives. However, like many good exam essay questions, the key aspect may not be the final answer, so much as the thought processes and how they are arrived at. Several are explored below. A strong understanding of the many different forms that risk can take is beneficial for portfolio managers, but it is also extremely important that wealth managers and advisers effectively communicate product risks to clients.

CREATION AND DESTRUCTION OF RISK

In everyday life, personal risk can easily be created. Consider if one wants to cross a busy, hazardous road to reach the sweet shop on the other side. Stepping onto the road creates risk, returning to the pavement (or reaching the pavement on the other side) extinguishes that risk.

In the world of financial markets risk is acquired by investing in an asset. Once acquired, the value of an asset will *generally* have an uncertain future, thus it carries financial risk. The removal of that risk is accomplished by selling the asset, accepting its current price. For the sake of this article, we assume that cash has no risk, although at times history has proved this to not be the case, and a degree of inflation risk is frequently present. This represents a convenient simplification for the current discussion. Alternatively, the arguments could be phrased in terms of additional risk above that of cash.

This explains the appearance of ‘... unless a financial asset is bought or sold’ in the hypothesis, but introduces a suspicious appearance of the

word ‘generally’, italicised above. As is so often the case, by exploring one issue with the hypothesis, another has been revealed. Nevertheless, the purchase and sale of assets as a means of taking on or removing risk seems sufficiently fundamental. This would appear to be a useful step forwards.

RISK AND RETURN

The assertion was that once acquired, the value of an asset will generally have an uncertain future. If the word ‘*generally*’ had not been included as a get out, the reader would surely have countered “but what about the risk-free asset?” or some such, pointing out that some assets have a predetermined value at some future point guaranteed by exemplary issuers. Indeed, such assets might be at least as safe as the cash that has arbitrarily been declared as having no risk.

By including in the hypothesis ‘for a given level of expected return’, we appeal to a generalised risk-return trade-off, whereby riskier assets (whatever that means) are generally accepted to have a higher level of return, a sort of idealised Capital Market Line or risk premium expectation, for example see [1], [2].

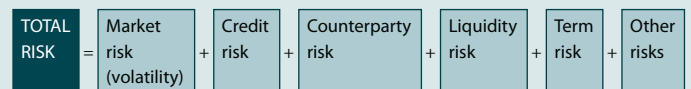
Another way of looking at this may be to imagine two financial products which offer the same level of return, but purport to do so at markedly different levels of risk. This raises the question as to why the two risk levels are so different and to wonder where the risk has gone. Does the lower risk product really have as little risk as it claims to? This smacks of ‘if it seems too good to be true, it probably is’ and so raises curiosity, or maybe suspicion, depending on the opinion of the motives involved.

So, we proceed with our thought experiment on the basis of risk ‘for a given level of return’, since it allows us to explore some interesting ideas around the transmutation of risk by financial alchemy.

ELEMENTS OF RISK

The word ‘risk’ is mostly used in a rather imprecise way. Does it mean volatility (here referred to as market risk), credit risk, risk of default, liquidity risk or what? In the current discussion, it should mean all types of risk, both those above and more, and indeed this is rather the point. Risk may be regarded as not having sufficient cash when it is required, which helps emphasise that volatility (or market risk) is hardly a complete measure of risk alone [3]. This is where the transmutation of risk between its different ‘elements’ comes into play.

There are a number of different ways of breaking down risk into its component parts (see [1], [4], [5], [6]). The breakdown below is intended to be illustrative rather than comprehensive. One breakdown of risk into elemental components is as follows.



In outline, the risks above are market risk as captured by volatility or pricing variability; credit risk that a bond issuer will be unable to pay or be downgraded; counterparty risk that the other party to some agreement will be unable to meet their obligations (often in relation to over-the-counter derivatives); liquidity risk that a would-be seller of an asset finds that when they need to sell, they cannot, or no buyers can be found at a reasonable price; and term risk that an asset holder is locked into their position for an extended period and finds themselves unable to exit should they need to do so. Some of these may be so-called ‘tail risks’ in that they would only materialise under fairly extreme conditions. Of

course, until such time as it is no longer possible for them to occur, this does not mean they do not exist.

Since the above list is not comprehensive, the final element of 'other risks' is a catch-all, which would, for example include risks such as currency risk, operational risks and others not listed.

Clearly several of the risks listed are interrelated, for example credit risk and counterparty risk both relate to the failure of a counterparty to meet obligations, although they have slightly different connotations. Similarly, liquidity risk and term risk are related, since a lack of liquidity could arise as a result of being locked into a product for an extended term.

The hypothesis now reveals a slightly sinister aspect; some sorts of risks can be readily measured (and will therefore tend to be visibly reported as 'risk'), while there are those that are harder to measure. These harder to measure risks can easily become neglected, and potentially swept, invisibly, under the carpet – until of course such times as they are uncomfortably proved to matter after all.

Thus, we are broadly interested in risk for a given level (or expected level) of return and by our hypothesis, ask whether actual total risk levels are indeed similar, even if headline risk numbers (likely only volatility and maybe credit risk) are markedly different.

The visual image is to think of total risk rather like a balloon – on its surface are indicated areas labelled as 'volatility'; 'credit risk'; and so on. If a product's risk balloon (with a given level of return) is squeezed to diminish volatility, the hypothesis suggests that the balloon must bulge out somewhere else, perhaps at 'credit risk', or 'counterparty risk' – since the air volume inside the balloon is fixed (for the scientists, we assume an incompressible gas inside the balloon).

THE ALCHEMY OF RISK

To support the hypothesis, we now look at some examples which may be informative for the reader and start to draw out some of the less obvious risks of certain varieties of financial products.

Consider three simplified fictitious products, all of which offer similar expected returns, say in the order of mid-single-digit annual returns.

1. A large fund, thoroughly diversified across asset classes and geographical locations.
2. A company offering an actuarially 'smoothed' return based

upon investment in its underlying large multi-asset fund, with lock-in periods and periodic bonus payments.

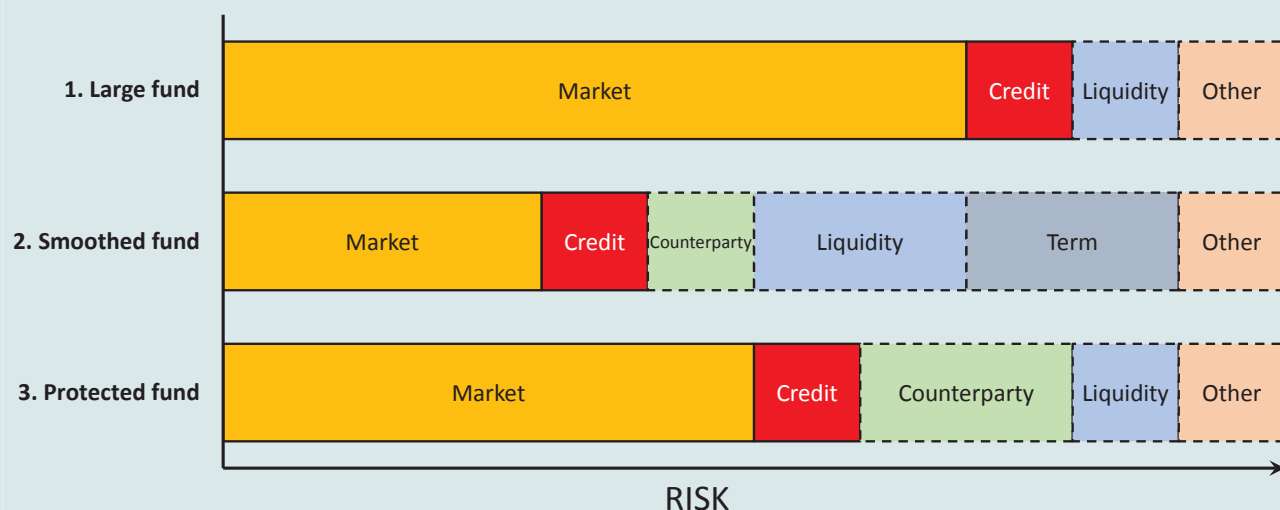
3. Investment in a well-diversified portfolio of assets with a guarantee that the value of the investment cannot fall below 80% of the initial investment, potentially for a small premium (which it is assumed does not materially affect the returns).

In the case of the first, the well-diversified fund, there would be a degree of volatility in quoted fund prices, which is market risk. The fund also carries a range of other risks, such as credit risk if it includes bonds, liquidity risk if some assets are not immediately saleable and so on (see figure below).

Turning to the second product. This apparently, being smoothed, may have little volatility. Does this make it lower risk? Not by our hypothesis. So how has the reduction in volatility been accomplished? In the example, the company offering the product has a large underlying portfolio of assets, which, for simplicity we assume as being like the well-diversified portfolio of the first case. The company then puts assets on one side during good times (reducing the investment return), and uses these during bad times to smooth volatility. This depends on the financial strength of the company in question – the investor has replaced market risk with counterparty risk. Even if the company manages the process with a large underlying pool of assets set on one side, this risk is still present in some form. Additionally, the lock-in periods present the investor with liquidity risk (if they decide they need to encash their investment early) and term risk since they must remain invested for suitable periods to receive the bonus payments. The lock-ins and periods required for bonus payments may also increase counterparty risk by keeping the investor exposed to the product for longer than they might have been otherwise.

For the third case, there may be some volatility in the portfolio, as in the first case; but apparently this is capped at 20% downside, since 80% of the initial investment value is guaranteed. But how is this guarantee accomplished? It may be that the sponsoring company uses its own financial muscle (adding counterparty risk), or it could use derivatives to lay off the risk. If derivatives are used, these could be over-the-counter, which means the risk has been sold to a limited number of other market participants (also counterparty risk), or else exchange-traded derivatives could have been used. Exchange-traded derivatives may permit the nearest thing to the 'destruction of risk' in this context, because they are guaranteed by the exchange via 'novation' – but what this really means

Illustration of the alchemy of risk. Market and credit risk may be apparent, while other risks may be less obvious.



is that the risk of failure has been spread over all market participants – thinly spread if the sums are small, as over many participants – but still there, lurking as risk, and not destroyed.

LIQUIDITY RISK

Now consider a different proposition, a comparison of a fictitious direct commercial property open-ended fund (whereby the fund itself owns physical buildings), with a fictitious multi-asset fund invested in a range of equities and bonds. The multi-asset fund undoubtedly exhibits volatility, seen through daily price fluctuations, with credit risk from the bonds it holds and so forth. Meanwhile the direct commercial property fund appears to have low volatility, suggesting lower risk. But is this really the case? The direct property fund will hold some liquid assets to meet investor redemption requirements, but apart from that it owns buildings. Its prices only change by small amounts because the majority of its assets tend to get revalued either by a surveyor reappraising them, or else when sold. If many investors in this fund wished to redeem their holdings, once the liquid assets are exhausted, the fund manager must sell buildings to raise cash – a slow and uncertain process. Indeed, if the manager becomes a forced seller he is unlikely to realise a good price for the buildings sold. Thus this fund may be low in volatility, but it clearly carries liquidity risk. The risk balloon may have been squeezed around volatility, but the illiquid nature of property means it bulges out at liquidity risk.

DISCUSSIONS BETWEEN CLIENTS, ADVISERS AND WEALTH MANAGERS

The examples above illustrate the important roles that advisers and wealth managers play when communicating product risks to their clients. Many products have been developed that appear to reduce risk, perhaps by reducing apparent market volatility. However, on closer examination these may bear higher risks elsewhere.

In the examples above, even a large well-diversified fund is likely bearing risks that may not be well captured by volatility (eg, credit risk for any bonds held). The other structures, developed to reduce market risk, replaced it with counterparty, liquidity and term risks. In the case of direct property funds, while volatility may appear lower, the limited availability of readily saleable assets in fund portfolios means that this has been obtained at the expense of liquidity risk.

It would be easy for advisers to promote assets with apparently low

volatility for the expected levels of return as ‘lower risk’ to clients, however it would appear likely that the lower volatility has been achieved by the assets taking on higher counterparty, liquidity or other risks by way of counter-balance. In these circumstances, it is crucially important that advisers and wealth managers work hard to ensure that their respective client bases fully appreciate the sources of risk taken on, rather than focusing solely on areas where risk may have been reduced.

IN CONCLUSION

As a practical tool the hypothesis seems to have proven quite useful. Really what it does is remind us to explore where the risk has gone, and to help focus our minds when faced with the ‘*if it seems too good to be true ...*’ suspicion. It also helps an investor appreciate that with risk it may be a matter that you cannot avoid it, but that you maybe can choose which kinds of risk you are prepared to accept, if you like ‘*you pay your money and make your choice*’. Apart from being a useful mindset for portfolio managers, it is extremely important that both of these aspects are effectively communicated by advisers and wealth managers to their clients.

So, on balance, we stand by our hypothesis, provided we are not asked to define anything too rigorously.

Hypothesis: for a given level of expected return, risk cannot be created or destroyed, it can only change form, unless a financial asset is bought or sold.

REFERENCES

- [1] F. J. Fabozzi, *Investment management*, New Jersey: Prentice Hall, 1995.
- [2] Q. G. Rayer, *Portfolio construction theory* [exam workbook], London: Chartered Institute for Securities & Investment, 2017.
- [3] R. H. Jeffrey, ‘A new paradigm for portfolio risk,’ in *The handbook of risk*, New Jersey, John Wiley & Sons, 2003, pp. 27–33.
- [4] M. Choudhry, *An introduction to value-at-risk*, 2nd ed., Guildford: Biddles for Securities Institute Services, 2000.
- [5] M. Crouhy, D. Galai and R. Mark, *The essentials of risk management*, 2nd ed., New York: McGraw-Hill Education, 2014.

QUINTIN RAYER, CHARTERED FCSI, DPHIL (OXON)

Quintin Rayer, Chartered FCSI, is a Chartered Wealth Manager. He holds a Physics degree from Imperial College London and a Physics doctorate from Oxford University. Quintin has applied knowledge from nuclear and aerospace engineering to areas in finance, working for actuarial and investment consultancy firms as well as a multinational European bank for nearly ten years. Projects have included substantial and innovative development of quantitative fund selection and analysis techniques, risk monitoring and portfolio optimisation, including in-house training for analysts and relationship managers. Quintin has completed the Sustainable Investment Professional Certification (SIPC) with the John Molson Business School, becoming this programme’s first graduate in the Channel Islands and the second in the UK.



WILL DICKSON, CHARTERED MCSI, BSC (HONS), MSC,

Will Dickson is a Chartered Member of the CISI and a Chartered Wealth Manager. He holds an Accounting and Finance BSc from the University of Bath and a Finance and Investment MSc from the University of Exeter. Will began his investment career working for a national wealth management company and is now head of portfolio management for P1 Investment Management. He has a broad knowledge and experience in qualitative and quantitative investment research, as well as applying this to portfolio construction. Will’s talent was recognised by *Citywire* when he was named as one of the Top 30 investment managers under the age of 30 in 2016.

