

Portfolio Risk Budgeting

| Stan Miranda; Mathew Libling |

This is a financial promotion. Your capital is at risk, the value of investments may fall and rise and you may not get back the full amount you invested. Past performance is not indicative of future returns.

In this paper, we define how any long-term investor should establish a budget or target amount of market risk¹ for an overall portfolio. Market risk is the largest driver of overall portfolio returns and of potential downside. The essence of any process to set a market risk budget is making trade-offs between long-term target returns and the maximum expected loss in the process of achieving that target return. This paradox is the crux of appropriate risk budgeting. A dispassionate examination of the realities of the answers to both the required return and maximum loss questions is necessary to avoid the common investing pitfalls of greed and complacency.

In a separate paper entitled “The Partners Capital Approach to Risk Management” we outline the six key risks we believe should be managed within portfolios: namely market risk, manager risk, liquidity/illiquidity risk, counterparty risk, leverage risk, and Internal operational risk. Of those risks, three represent the primary source of investment returns:

- **Market Risk:** Market Exposures drive 70% of the returns (positive and negative) of most diversified portfolios. We call this portion of your portfolio performance the underlying market exposures or “beta”. There are four core types of market beta in most diversified portfolios: equity market risk, interest rate risk, inflation risk and credit risk. Equity risk has us being paid for taking corporate profit risk. Credit risk is paying us for taking the risk of default or not being paid back on a loan. Interest rate risk pays us for the risk that money rates will go up and we forego those higher returns. Finally, inflation risk pays us for taking the risk of a loss of purchasing power.

Note that we do not use the standard deviation of returns as the key measure of market risk. Such volatility measures are helpful for assessing the likely range of downsides against various scenarios, market betas achieve the same outcome and also are the best measure for regulating portfolio risk. For example, rebalancing to betas most often has us buying low and selling high while rebalancing the portfolio. Rebalancing to standard deviation targets most often results in buying high and selling low in the rebalancing process.

- **Illiquidity Risk:** Illiquid markets such as Private Equity and Private Credit have historically generated 3-5% of additional return relative to public market equivalents over the very long term, although at time of writing recent outperformance has been larger. A portfolio’s tolerance for illiquidity without failing to meet any liabilities is in our estimate responsible for c. 15% of total portfolio returns.
- **Manager Risk:** Managers seek to generate outperformance relative to a passive index of matching risk, or “alpha”. This is difficult, with 90%+ of managers underperforming “beta” benchmarks net of fees. To generate this additional return, it is necessary to deviate from market exposures and introduce additional risk to the portfolio. We estimate that this additional risk explains approximately 15% of the average institutional portfolio’s returns.

This paper is focused on just market risk and setting a target for such risk for the overall portfolio. We have authored separate papers on both illiquidity and manager risk which can be found in our Intellectual Capital Library (“ICL”). We consider the decision of how much market risk a portfolio should take to be perhaps the most important decision an investor setting out on a long-term investment strategy will take. In our view, it should be the key focus of every investment committee. It is therefore the first exercise we undertake with every new prospective client before finalising our investment mandate or “Investment Policy Statement”. We note that at each point on the risk spectrum, maintaining a static and consistent level of risk through full investment cycles including deep downturns has led to outperformance. In other words, those portfolios who have accurately set and then maintained adherence to their Market Risk Budget have outperformed those who have not.

The essence of any process to set a market risk budget is making trade-offs between long-term target returns and the maximum expected loss in the process of achieving that target return. It is possible that there is no conflict between these. This is where the required return corresponds with an expected maximum drawdown that is below the investor’s threshold for maximum loss. Fully funded pensions are often in this situation, where expected inflows will pay for most of the expected outflows, and only very low investment returns are required.

PARTNERS CAPITAL
Intellectual Capital Whitepaper

But more often is the case where the target return corresponds with an expected maximum loss that is above the investors' threshold for loss. After testing the loss threshold thoroughly, the only recourse is to adjust target returns down by accepting lower spending rates from the portfolio, or to accept that the capital value can go down each year.

This paradox is the crux of appropriate risk budgeting and a dispassionate examination of the realities of the answers to both questions is necessary to avoid the common investing pitfalls of greed and complacency. We will examine each of these inputs to the risk budget question, target returns and maximum loss, in turn below. Before we do, it is necessary to consider how best to measure market risk. This allows the answers to those questions to be expressed in simple metrics allowing comparison of otherwise disparate concepts of risk and return.

Measuring Market Risk in Portfolios

Risk budgeting ultimately involves setting target exposures to each of the four market risk factors or betas. Our whitepaper on asset allocation addresses how we allocate across betas and across asset classes. This paper focuses on how to set an overall portfolio risk budget using a single equity-like risk measure which we refer to as "equivalent net equity beta" or ENEB. The value of having a single total portfolio risk measure, in addition to the target betas for each of the four core betas, is to facilitate overall portfolio risk management.

While a single risk metric, vs the four beta risk targets, introduces more error in risk management, we have found it to be valuable to rebalancing processes and for simplifying discussions internally and with clients about risk budgeting. Having a single consolidated risk measure allows us to know when a portfolio's overall risk has moved too far away from target (above or below), such that we can rebalance it back to its target risk level. This facilitates tactical asset or beta allocation, while maintaining static overall portfolio risk. For example, in certain points in the market cycle, it may be wise to add to credit and take away from equities. When we do that, we will look to the overall risk metric to ensure that we do not lower that overall portfolio risk in that process. Leverage and derivative instruments may be deployed to effect such rebalancing.

The ideal single market risk factor would be one that enables us to sum up the total amount of equity, credit, inflation and interest rate risk into one measure that provides a significantly accurate estimate of the maximum drawdown in various scenarios (types of market crisis). You can see in Exhibit 1 that different asset classes embed different amounts of the four core market risks. The betas shown in the table below represent our normative forward looking assumptions based on best estimates of pairwise correlations and standard deviation.

Exhibit 1: Asset Classes embed various levels of different market risks.

| Asset Class | Benchmark | Market Beta | | | |
|-----------------------------|--|-------------|--------|-----------|---------------|
| | | Equity | Credit | Inflation | Interest Rate |
| Government Bonds | Barclays Treasury 5-10 Year TR USD | | 0.1 | 0.5 | 1.0 |
| High Yield Bonds | Barclays Global High Yield TR USD Hedged | 0.4 | 1.0 | | 0.2 |
| Absolute Return Hedge Funds | HFRI FOF: Conservative Index | 0.1 | | | |
| Equities | MSCI World NR LC | 1.0 | 1.4 | | |
| Inflation-Linked Bonds | Barclays Global Inflation Linked TR USD Hedged | | | 1.0 | 0.5 |
| Commodities | Bloomberg Commodity Index TR LC | 0.4 | 0.2 | 0.8 | |
| Real Estate | IPD UK All Property Monthly TR | 0.2 | 0.1 | 0.2 | |
| Private Equity | State Street PE Index | 1.0 | 0.7 | | |

Source: Partners Capital

Shading Key: Darkest shading equates to highest exposure of this asset class (rows) to the market risk (columns)

Our ENEB risk metric translates the different types of market risk into public equity risk terms. We start by measuring the individual beta exposures in the portfolio to arrive at, for example, an equity beta measure for actual equity risk exposures, a credit beta measure for actual credit exposure, an inflation beta measure for actual inflation exposure and a rates or duration beta measure for actual interest rate risk in the portfolio. Then, in this four beta example, we translate the credit, inflation and rates betas into equity betas (i.e., the correlation of credit risk to equity risk). In essence, we arrive at the portfolios overall expected equity beta, in the belief that that is the most relevant single measure of risk, even for the most complicated and diversified modern portfolios.

The exhibit below shows an example calculation for a balanced portfolio translating asset classes into a single measure of equity beta. The conversion factors are based on observed historical relationships between asset class returns and equity market returns. So, naturally, private and public equities have a beta of 1.0, while other asset classes have lower sensitivity to movements in equity markets. In the example in Exhibit 2, a multi asset class portfolio has risk equivalent to holding 60% in equities and 40% in cash.

The benefit of this metric is that it makes performance predictable relative to the market. A portfolio with a 60% equity-like risk would be expected to capture 60% of the equity market return. In the context of the 2008 Financial Crisis – where the peak-to-trough loss was -51% (Oct 2007-Feb 2009) – the hypothetical portfolio would have been expected to lose approximately 30% of its value. This provides a simple heuristic, which when combined with historical simulations provides the backdrop for comparing two disparate portfolios and considering their downside potential.

Now, let's turn to the first of our two core inputs to the process for arriving at a target risk or ENEB.

Setting the Target Required Return

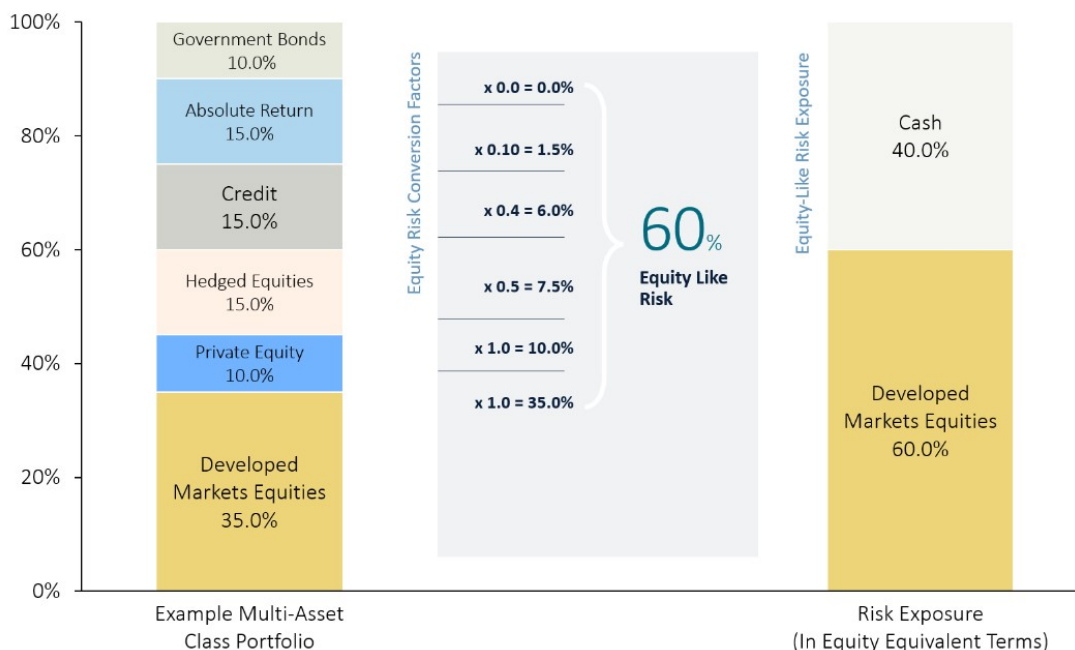
Investment portfolios and investment growth are not ends in and of themselves but rather tools to facilitate more tangible objectives. For some investors this may be to support spending throughout their life with limited risk of a need to reduce spending. For another, the aim may be to grow the wealth such that future generations benefit from an increased level of comfort. For institutions it is often, though not always, to preserve the spending power of the portfolio in perpetuity. All of these real-world objectives feed into the minimum required return. The majority of real-world objectives can be distilled into four contributing factors:

1. Maintenance of current asset value in real terms.
2. Meeting the portfolio's annual liabilities.
3. Desire for wealth accumulation over and above portfolio value preservation net of liabilities/expenditure.
4. Time horizon and resulting willingness to consume capital in order to meet liabilities.

In other words, a portfolio's return requirement can be expressed as:

$$\text{Required Return} = \text{Inflation Expectation} + \text{Annual Expenditure} + \text{Growth Ambition} - \text{Annual Allowable Capital Consumption.}$$

Exhibit 2: Calculating Equity-Like Risk from a mix of asset classes.



We discuss each of these contributing factors in turn, before elucidating this process through means of a few examples:

Setting Inflation Expectation: For each portfolio it is necessary to consider the inflation measure which is most relevant. For some portfolios spending may be linked to a particular subcomponent of inflation, though for most we find the relevant country inflation measure to be a sufficient proxy over the longer term. Our long-term inflation expectation is largely derived from the pricing of Treasury Inflation Protected Securities (TIPS), or the equivalent inflation-linked bond in other regions/currencies. More specifically, the difference between the yield on a nominal fixed-rate bond and the real yield on an inflation-linked bond of the same maturity provides the breakeven inflation rate, a measure of the aggregate inflation expectation over the life of the bond. While forecasting 10-year inflation is inherently very difficult, historical data shows that the breakeven rate is an unbiased predictor of future inflation (i.e., over the last 30 years, actual inflation has overshoot and undershot the level previously forecast by the breakeven rate with roughly equal frequency).

Meeting Annual Portfolio Liabilities: For individual and institutional clients alike, we conduct an exercise to understand the current annual spend. This involves assessing current total spending net of non-portfolio income and then considering how that net spending is likely to develop over the next 10 years ignoring inflation which has been considered separately. This will be affected by any anticipated changes in either non-portfolio revenue or expenditure. It is therefore crucial to consider the organisational or individual “business plan” including changes in operating model or individual circumstance such as retirement. We translate this into an average expenditure as a percentage of portfolio value. Importantly, at this stage we include only known/expected liabilities and not potential future ambitions.

Funding Growth Ambitions: The previous two considerations have been in respect of maintaining the status quo, that is to say defensively protecting the portfolio from expenditure and inflation erosion. For some investors, including many charitable endowments and some family offices, those are the primary investment objectives. However, other investors have growth ambitions for the capital driven by real world objectives. For some individuals this relates to multi-generational wealth transfer and combatting the dilution of wealth among multiple beneficiaries. For other institutional investors it may result from additional charitable or business aims that are currently not fundable, but which could be facilitated by investment capital growth. These ambitions have a defined increase in expenditure and a target timeline before delivery. We incorporate those into the forward-looking portfolio projection to understand the additional investment returns required to be generated.

Meeting portfolio liabilities from principal: The three considerations expounded upon above are all requirements for capital. However, for those capital requirements to be included in minimum required return the assumption would be that only profits can be spent whilst the principal remains protected in real terms. For organisations or individuals who wish the portfolio to have a perpetual or intergenerational time horizon this assumption may hold. However, for many investors that is not the case. Many investors have a finite time horizon, either because the aims of the portfolio are not intergenerational or because the organisation is designed to be of finite life. One such example might be a charitable organisation who has decided to “over-distribute” in order to wind-up the organisation in a defined time frame. Perhaps one of the most notable examples of this was Duty Free Shoppers’ founder Chuck Feeny and his Atlantic Philanthropies Foundation which had a finite life of 18 years and spent 100% of the c. \$2B of capital in that period. For those investors, taking the likely time horizon into account may suggest that some portion of expenditure can be met from principal, effectively reducing the minimum required return.

Once these four drivers are understood, it is best practice to recognise the estimation error implicit in such a calculation and include some margin of safety. Below we consider three practical examples of setting a minimum return:

A traditional charitable grant making endowed foundation: This organisation has a spending rule defined by which capital is transferred from the endowment into an expenditure account on a monthly basis. This spending rule translates to between 3.5-4.0% of total portfolio value per annum. However, the organisation has no ambitions to materially increase its charitable activity and has a perpetual time horizon. As such, the minimum required return for this organisation is inflation plus 3.5-4.0% which likely translates to c. 7%. Inclusive of a modest margin of safety, the minimum required return for the organisation was set at 7.5% for the next 10 years.

A wealthy individual with no dependants: This individual’s expenditure translates to 3% of the portfolio due to the large portfolio size and their modest expenditure. In addition, with no dependants, the individual is not concerned with residual value of the portfolio at end of life. As such, it was agreed that 2% of portfolio capital could be consumed per annum. As a result, the minimum required return was inflation plus 1% (being the net effect of expenditure and capital consumption) or c. 4% inclusive of a margin of safety. For this individual, minimum required return is unlikely to be constrained by a maximum loss threshold.

PARTNERS CAPITAL
Intellectual Capital Whitepaper

An educational institution with an ambition for needs blind admissions within 10 years: This institution's expenditure is linked to educational inflation which has tracked c.1% above long-term inflation. In addition, current expenditure is 4% of portfolio value and the portfolio will require real growth of 2% per annum net of expenditure to meet the needs blind ambition. As such, the return requirement for the portfolio, inclusive of a margin of safety is $3+1+4+2+0.5=10.5\%$. This is likely to require a higher risk portfolio with a higher allocation to illiquid assets such as private equity and private debt.

Once the investment objectives are clarified, this can be translated into a minimum level of risk and/or illiquidity that is required in order to have a high probability of meeting these objectives. Exhibit 3 shows some illustrative calculation of expected portfolio returns (in the matrix cells) as a result of a given level of equity like risk and the proportion of the portfolio allocated to illiquid asset classes. Behind this model is a set of asset class return, risk and correlation assumptions that we will not take the time to share and debate here.

As a result, for the ambitious educational institution described above, meeting that return target will require significant equity like risk and/or significant illiquidity, as exemplified by the green shaded section of Exhibit 3, to the right and below the red line. This illustration suggests that the 10.5% target return would require at least an equity-like risk of 100% and a minimum of 70% allocated to private markets illiquid investments.

This illustrative portfolio construction would have high expected volatility of returns, requiring the decision maker to potentially moderate their return objectives. We turn to that consideration below.

Setting a Maximum Loss Tolerance

A portfolio's required return and implied minimum equity-like risk is only one part of the risk budgeting equation. The other part is an understanding of the maximum drawdown that a portfolio can withstand. We think of this both in terms of rolling three-year portfolio decline and a short peak to trough shock to the portfolio. As mentioned above, setting this loss tolerance has two components:

1. A practical consideration of the likelihood of meeting portfolio objectives and liabilities in the event of a significant drawdown.
2. An understanding of the investment outcomes which may lead the client to abandon the investment strategy. High risk, high reward strategies come with contingent downside risk, often requiring the strategy is abandoned and the return objectives to not be achieved.

In much the same way as required return implies a minimum equity risk for the portfolio, a maximum drawdown implies a maximum equivalent equity risk. The exhibit below shows likely drawdowns in given equity return scenarios for varying levels of equivalent equity risk. We illustrate both one in ten-year (-30%) and one in twenty-year (-50%) equity declines in considering risk tolerance. As such, once a maximum drawdown tolerance has been identified, the maximal risk a portfolio can tolerate becomes clear.

Exhibit 3: Risk and Illiquidity are Key Drivers of Return.

| Allocation to Private Equity & Private Debt | Portfolio Risk Level (% of Equity) | | | | | | | |
|---|------------------------------------|-------|-------|-------|-------|-------|--------|--------|
| | 40% | 50% | 60% | 63% | 70% | 80% | 90% | 100% |
| 0% | +5.9% | +6.2% | +6.6% | +6.7% | +7.0% | +7.3% | +7.7% | +8.0% |
| 10% | +6.2% | +6.7% | +7.1% | +7.2% | +7.4% | +7.8% | +8.1% | +8.4% |
| 20% | +6.6% | +7.1% | +7.6% | +7.7% | +7.9% | +8.2% | +8.5% | +8.7% |
| 30% | +6.9% | +7.5% | +8.1% | +8.3% | +8.4% | +8.6% | +8.9% | +9.1% |
| 37% | +7.2% | +7.8% | +8.4% | +8.6% | +8.8% | +9.0% | +9.1% | +9.3% |
| 40% | +7.3% | +7.9% | +8.5% | +8.7% | +8.8% | +9.0% | +9.2% | +9.4% |
| 50% | +7.7% | +8.2% | +8.7% | +8.9% | +9.1% | +9.3% | +9.5% | +9.8% |
| 55% | +7.8% | +8.3% | +8.9% | +9.0% | +9.2% | +9.4% | +9.7% | +10.0% |
| 60% | +8.0% | +8.5% | +9.0% | +9.1% | +9.3% | +9.6% | +9.9% | +10.1% |
| 65% | +8.2% | +8.6% | +9.1% | +9.2% | +9.4% | +9.7% | +10.0% | +10.3% |
| 70% | +8.4% | +8.8% | +9.2% | +9.3% | +9.5% | +9.9% | +10.2% | +10.5% |

Source: Partners Capital

Note: Equity-like risk expresses the portfolios equivalent risk in terms of developed market global equity risk.

Hypothetical return expectations are based on simulations with forward looking assumptions, which have certain inherent limitations. Such forecasts are not a reliable indicator of future performance

Exhibit 4: Risk Budgets are tested against equity stress.

| | | Risk Budget: Equity-like Risk % | | | | | | | |
|--|------|---------------------------------|--------|--------|--------|--------|--------|--------|--------|
| | | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% |
| Return of Developed Market Equities in peak to trough drawdown | -5% | -1.0% | -1.5% | -2.0% | -2.5% | -3.0% | -3.5% | -4.0% | -4.5% |
| | -10% | -2.0% | -3.0% | -4.0% | -5.0% | -6.0% | -7.0% | -8.0% | -9.0% |
| | -15% | -3.0% | -4.5% | -6.0% | -7.5% | -9.0% | -10.5% | -12.0% | -13.5% |
| | -20% | -4.0% | -6.0% | -8.0% | -10.0% | -12.0% | -14.0% | -16.0% | -18.0% |
| | -25% | -5.0% | -7.5% | -10.0% | -12.5% | -15.0% | -17.5% | -20.0% | -22.5% |
| | -30% | -6.0% | -9.0% | -12.0% | -15.0% | -18.0% | -21.0% | -24.0% | -27.0% |
| | -35% | -7.0% | -10.5% | -14.0% | -17.5% | -21.0% | -24.5% | -28.0% | -31.5% |
| | -40% | -8.0% | -12.0% | -16.0% | -20.0% | -24.0% | -28.0% | -32.0% | -36.0% |

Source: Partners Capital

Hypothetical return expectations are based on simulations with forward looking assumptions, which have certain inherent limitations. Such forecasts are not a reliable indicator of future performance.

Practical limitation on drawdown tolerance: Since the primary purpose of the portfolio is to meet investment objectives, it is necessary to consider not only whether the portfolio is likely to meet objectives over the long term but if, in the downside case, the portfolio will be in a position to recover. If portfolio value declines but assets must still be sold to meet portfolio withdrawals for liabilities, any “paper losses” will be crystallised as actual losses and could compromise the future likelihood of meeting portfolio objectives. Therefore, we run scenario-based analysis to understand:

- What return would the portfolio need to generate following various declines for all investment objectives to be met and how realistic are those returns to be able to be generated?
- What is the probability, based on Monte-Carlo simulations, for various levels of risk, that the portfolio fails to meet its investment objectives over a ten-year period both with and without an unexpected market shock?
- In the event that investment objectives are not met, what is the bottom decile outcome that investors could face. In other words, when considering risk we consider not only how likely is it that objectives are not met, but also how severe and recoverable could the situation be?

The answers to these questions are consolidated to then ask whether the required risk is tolerable relative to the expected returns and the objectives such returns help to achieve. This is where no systematic model can help. Judgment intervenes front and centre and the trade off is made here, with these risk scenario outcomes in front of us. With these inputs, a target return and risk budget is agreed and documented in the Investment Policy Statement. This follows the completion of a detailed suitability assessment process (where required by local regulators).

The above analysis proved to be especially important during the 2008 crisis. Although the correct answer with hindsight was clearly to maintain risk, this was a difficult choice to make. For some it was a rational decision to reduce risk at the time based on the possible apocalyptic scenario that could have unfolded and the resultant risk to portfolio objectives. For others it was emotionally difficult. We learned from this process that a clear-eyed assessment of risk tolerance, downside potential and how that evolves as the market evolves was crucial.

Emotional limitation on drawdown tolerance: Implicit in the analysis we described above is the assumption that when the drawdown occurs the investor does not cut risk. We believe that the best performing institutional portfolios over the long term, at various points along the risk spectrum, have been those which have maintained the most static and consistent levels of risk through full investment cycles including deep downturns.

However, in our experience investing through significant past bear markets, holding one's risk constant is difficult. Maintaining the portfolio's risk level requires the constant measurement and monitoring of the look-through market exposures of the underlying asset managers comprising the overall portfolio and rebalancing to target risk levels (market exposures) when the collective risk of the managers deviates from long-term targets. This is our approach to managing the risk of our client portfolios which is labour and IT-system intensive and requires strong asset manager relationships with the accompanying transparency. This approach avoids the usual performance 'leakage' which accompanies portfolio management that seeks to time market risk exposure or leave the collection of asset managers to do this in an uncoordinated and often unintentional manner.

As well as being practically difficult and labour intensive, it is emotionally challenging. It is human nature to retreat from positions which have hurt the portfolio, even as they become increasingly more attractive. Although Partners Capital aims to overcome this human bias through investment rigour and advice, we find the worst outcomes occur when investors were unprepared for the possibility that the portfolio might decline that far.

At the outset of a client relationship, we assess any client's risk appetite through our suitability assessment process, including a series of questions in a questionnaire which has evolved over the years to find the best series of questions which can get to the most accurate and true assessment. The questionnaire, in essence, tests for reactions to losses over different time periods from one day to 10 years. We then try and reiterate that downside case periodically, so clients are clear about the risks being run. Emotional resilience to portfolio decline is not a static feature of an investor. Life situations and life stage alter our attitude to risk, and these should be periodically revisited, much as illiquidity tolerances should be.

Resolving the Paradox: What if required return and risk tolerance are in conflict?

The risk budgeting process we have outlined over the preceding pages is designed to force any inconsistencies between aims and constraints into the open. It is of course easier to establish a risk budget where required returns can be achieved without risking breaching maximum expected loss thresholds. However, if conflict does exist, it is our strong belief that it needs to be confronted and resolved, and not replaced by "hope." This can be done either through altering the required return by reducing spending, reducing growth ambitions or eating into capital or, more frequently, it can come through accepting the need for additional risk or illiquidity within the portfolio. Ensuring these decisions are made with full acceptance of the potential outcomes and not entered into lightly is in our mind one of the most important interactions between investment advisor and investment owner. Confronting the conflict and resolving it with these sorts of reconciliations, in our experience, is a critical prerequisite to seeing the investor achieving their long-term goals.

DISCLAIMER

Copyright © 2023, Partners Capital Investment Group LLP

Within the United Kingdom, this material has been issued by Partners Capital LLP, which is authorised and regulated by the Financial Conduct Authority of the United Kingdom (the “FCA”), and constitutes a financial promotion for the purposes of the rules of the Financial Conduct Authority. Within Hong Kong, this material has been issued by Partners Capital Asia Limited, which is licensed by the Securities and Futures Commission in Hong Kong (the “SFC”) to provide Types 1 and 4 services to professional investors only. Within Singapore, this material has been issued by Partners Capital Investment Group (Asia) Pte Ltd, which is regulated by the Monetary Authority of Singapore as a holder of a Capital Markets Services licence for Fund Management under the Securities and Futures Act and as an exempt financial adviser. Within France, this material has been issued by Partners Capital Europe SAS, which is regulated by the Autorité des Marchés Financiers (the “AMF”).

For all other locations, this material has been issued by Partners Capital Investment Group, LLP which is registered as an Investment Adviser with the US Securities and Exchange Commission (the “SEC”) and as a commodity trading adviser and commodity pool operator with the Commodity Futures Trading Commission (“CFTC”) and is a member of the National Future’s Association (the “NFA”).

This material is being provided to clients, potential clients and other interested parties (collectively “clients”) of Partners Capital LLP, Partners Capital Asia Limited, Partners Capital Investment Group (Asia) Pte Ltd, Partners Capital Europe SAS and Partners Capital Investment Group, LLP (the “Group”) on the condition that it will not form a primary basis for any investment decision by, or on behalf of the clients or potential clients and that the Group shall not be a fiduciary or adviser with respect to recipients on the basis of this material alone. These materials and any related documentation provided herewith is given on a confidential basis. This material is not intended for public use or distribution. It is the responsibility of every person reading this material to satisfy himself or herself as to the full observance of any laws of any relevant jurisdiction applicable to such person, including obtaining any governmental or other consent which may be required or observing any other formality which needs to be observed in such jurisdiction. The investment concepts referenced in this material may be unsuitable for investors depending on their specific investment objectives and financial position.

This material is for your private information, and we are not soliciting any action based upon it. This report is not an offer to sell or the solicitation of an offer to buy any investment. While all the information prepared in this material is believed to be accurate, the Group, may have relied on information obtained from third parties and

makes no warranty as to the completeness or accuracy of information obtained from such third parties, nor can it accept responsibility for errors of such third parties, appearing in this material. The source for all figures included in this material is Partners Capital Investment Group, LLP, unless stated otherwise. Opinions expressed are our current opinions as of the date appearing on this material only. We do not undertake to update the information discussed in this material. We and our affiliates, officers, directors, managing directors, and employees, including persons involved in the preparation or issuance of this material may, from time to time, have long or short positions in, and buy and sell, the securities, or derivatives thereof, of any companies or funds mentioned herein.

Whilst every effort is made to ensure that the information provided to clients is accurate and up to date, some of the information may be rendered inaccurate by changes in applicable laws and regulations. For example, the levels and bases of taxation may change at any time. Any reference to taxation relies upon information currently in force. Tax treatment depends upon the individual circumstances of each client and may be subject to change in the future. The Group is not a tax adviser and clients should seek independent professional advice on all tax matters.

Within the United Kingdom, and where this material refers to or describes an unregulated collective investment scheme (a “UCIS”), the communication of this material is made only to and/or is directed only at persons who are of a kind to whom a UCIS may lawfully be promoted by a person authorised under the Financial Services and Markets Act 2000 (the “FSMA”) by virtue of Section 238(6) of the FSMA and the Financial Services and Markets Act 2000 (Promotion of Collective Investment Schemes) (Exemptions) Order 2001 (including other persons who are authorised under the FSMA, certain persons having professional experience of participating in unrecognised collective investment schemes, high net worth companies, high net worth unincorporated associations or partnerships, the trustees of high value trusts and certified sophisticated investors) or Section 4.12 of the FCA’s Conduct of Business Sourcebook (“COBS”) (including persons who are professional clients or eligible counterparties for the purposes of COBS). This material is exempt from the scheme promotion restriction (in Section 238 of the FSMA) on the communication of invitations or inducements to participate in a UCIS on the grounds that it is being issued to and/or directed at only the types of person referred to above. Interests in any UCIS referred to or described in this material are only available to such persons and this material must not be relied or acted upon by any other persons.

Within Hong Kong, where this material refers to or describes an unauthorised collective investment schemes (including a fund) (“CIS”), the communication of this material is made only to and/or is directed only at professional investors who are of a kind to whom an



Intellectual Capital

unauthorised CIS may lawfully be promoted by Partners Capital Asia Limited under the Hong Kong applicable laws and regulation to institutional professional investors as defined in paragraph (a) to (i) under Part 1 of Schedule to the Securities and Futures Ordinance (“SFO”) and high net worth professional investors falling under paragraph (j) of the definition of “professional investor” in Part 1 of Schedule 1 to the SFO with the net worth or portfolio threshold prescribed by Section 3 of the Securities and Futures (Professional Investor) Rules (the “Professional Investors”).

Within Singapore, where this material refers to or describes an unauthorised collective investment schemes (including a fund) (“CIS”), the communication of this material is made only to and/or is directed only at persons who are of a kind to whom an unauthorised CIS may lawfully be promoted by Partners Capital Investment Group (Asia) Pte Ltd under the Singapore applicable laws and regulation (including accredited investors or institutional investors as defined in Section 4A of the Securities and Futures Act).

Within France, where this material refers to or describes to unregulated or undeclared collective investment schemes (CIS) or unregulated or undeclared alternative Investment Funds (AIF), the communication of this material is made only to and/or is directed only at persons who are of a kind to whom an unregulated or undeclared CIS or an unregulated or undeclared AIF may lawfully be promoted by Partners Capital Europe under the French applicable laws and regulation, including professional clients or equivalent, as defined in Article D533-11, D533-11-1, and D533-13 of the French Monetary and Financial Code.

Certain aspects of the investment strategies described in this presentation may from time to time include commodity interests as defined under applicable law. Within the United States of America, pursuant to an exemption from the US Commodity Futures Trading Commission (CFTC) in connection with accounts of qualified eligible clients, this brochure is not required to be, and has not been filed with the CFTC. The CFTC does not pass upon the merits of participating in a trading program or upon the adequacy or accuracy of commodity trading advisor disclosure. Consequently, the CFTC has not reviewed or approved this trading program or this brochure. In order to qualify as a certified sophisticated investor a person must (i) have a certificate in writing or other legible form signed by an authorised person to the effect that he is sufficiently knowledgeable to understand the risks associated with participating in unrecognised collective investment schemes and (ii) have signed, within the last 12 months, a statement in a prescribed form declaring, amongst other things, that he qualifies as a sophisticated investor in relation to such investments.

This material may contain hypothetical or simulated performance results which have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading. Also, since the trades have

not actually been executed, the results may have under- or over-compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any client will or is likely to achieve profits or losses similar to those shown. These results are simulated and may be presented gross or net of management fees. This material may include indications of past performance of investments or asset classes that are presented gross and net of fees. Gross performance results are presented before Partners Capital management and performance fees, but net of underlying manager fees. Net performance results include the deduction of Partners Capital management and performance fees, and of underlying manager fees. Partners Capital fees will vary depending on individual client fee arrangements. Gross and net returns assume the reinvestment of dividends, interest, income and earnings.

The information contained herein has neither been reviewed nor approved by the referenced funds or investment managers. Past performance is not a reliable indicator and is no guarantee of future results. Investment returns will fluctuate with market conditions and every investment has the potential for loss as well as profit. The value of investments may fall as well as rise and investors may not get back the amount invested. Forecasts are not a reliable indicator of future performance.

Certain information presented herein constitutes “forward-looking statements” which can be identified by the use of forward-looking terminology such as “may”, “will”, “should”, “expect”, “anticipate”, “project”, “continue” or “believe” or the negatives thereof or other variations thereon or comparable terminology. Any projections, market outlooks or estimates in this material are forward –looking statements and are based upon assumptions Partners Capital believe to be reasonable. Due to various risks and uncertainties, actual market events, opportunities or results or strategies may differ significantly and materially from those reflected in or contemplated by such forward-looking statements. There is no assurance or guarantee that any such projections, outlooks or assumptions will occur.

Certain transactions, including those involving futures, options, and high yield securities, give rise to substantial risk and are not suitable for all investors. The investments described herein are speculative, involve significant risk and are suitable only for investors of substantial net worth who are willing and have the financial capacity to purchase a high risk investment which may not provide any immediate cash return and may result in the loss of all or a substantial part of their investment. An investor should be able to bear the complete loss in connection with any investment.

All securities investments risk the loss of some or all of your capital and certain investments, including those involving futures, options, forwards and high yield securities, give rise to substantial risk and are not suitable for all investors.

