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# Market Consistent Economic Profit (MCEP)*

Linking Risk, Value and Strategy

## PricewaterhouseCoopers
Conor O'Dowd and Mark Young

* Please note that the basic concept in this outline and its associated algorithms are PwC intellectual property called **MCEP**
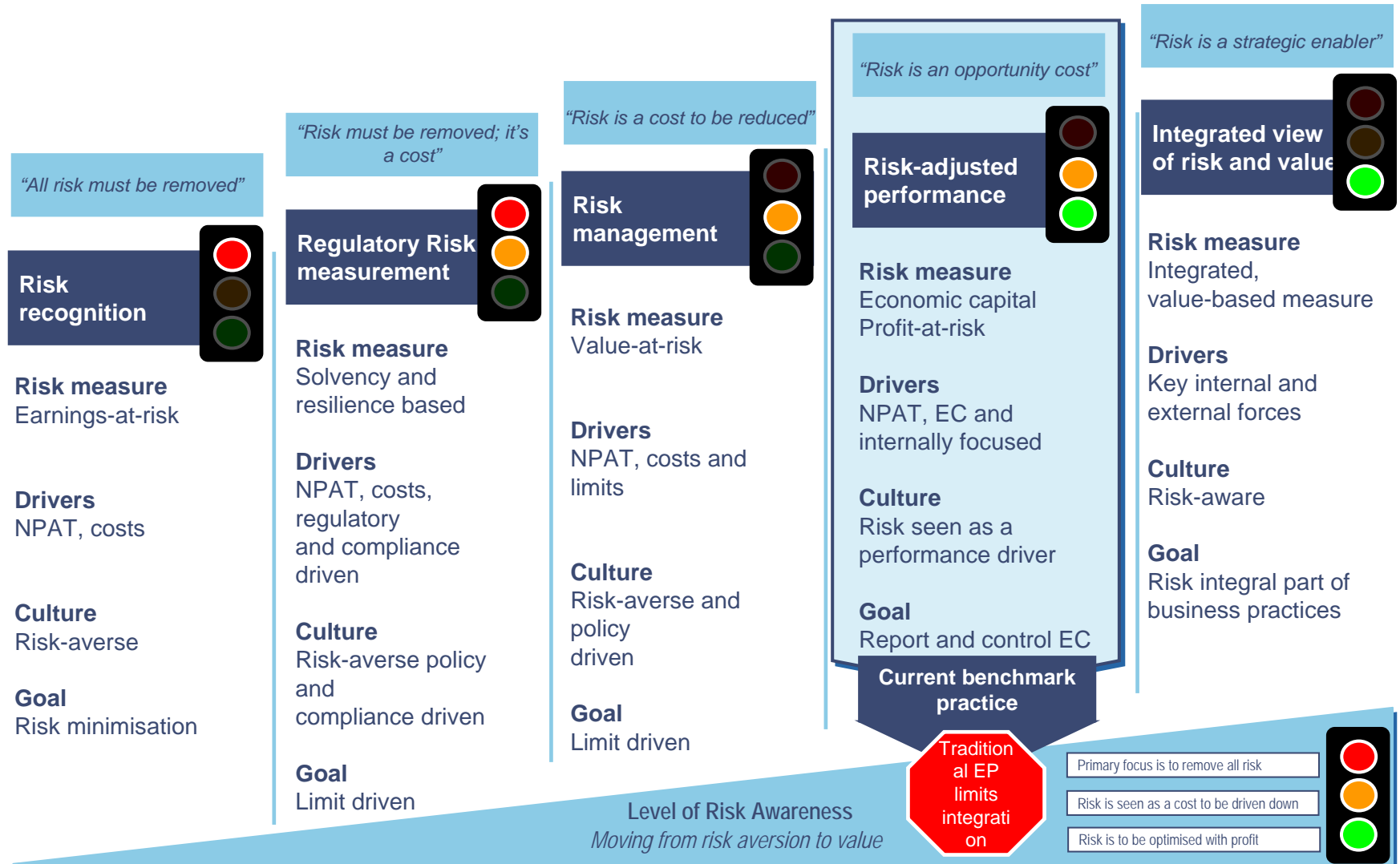
# Agenda

# Introduction

## Context

- The current risk-adjusted profitability approaches available to financial institutions have limitations.

- A principal limitation (common to all) is the inability to simply allocate and reconcile risk adjusted profit across differing dimensions within a Firm.

- PwC's Market Consistent Economic Profit (MCEP) approach overcomes this key limitation by simply expressing lower level risk adjusted profit as additive and reconcilable and maintains the benefits common to all other approaches.

## Purpose

- Explore the common taxonomy of risk adjusted profitability approaches, highlighting the benefits and limitations.

- Demonstrate how MCEP provides the breakthrough that brings risk adjusted profitability measures alive, providing real competitive difference.

- A case study of a residential mortgage portfolio and the insights that MCEP provides over and above other approaches.

* Please note that the basic concept in this outline and its associated algorithms are PwC intellectual property called **MCEP**

# The risk journey – a taxonomy of risk and risk culture

*"All risk must be removed"*

**Risk recognition**

**Risk measure**
Earnings-at-risk

**Drivers**
NPAT, costs

**Culture**
Risk-averse

**Goal**
Risk minimisation

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*"Risk must be removed; it's a cost"*

**Regulatory Risk measurement**

**Risk measure**
Solvency and resilience based

**Drivers**
NPAT, costs, regulatory and compliance driven

**Culture**
Risk-averse policy and compliance driven

**Goal**
Limit driven

---

*"Risk is a cost to be reduced"*

**Risk management**

**Risk measure**
Value-at-risk

**Drivers**
NPAT, costs and limits

**Culture**
Risk-averse and policy driven

**Goal**
Limit driven

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*"Risk is an opportunity cost"*

**Risk-adjusted performance**

**Risk measure**
Economic capital
Profit-at-risk

**Drivers**
NPAT, EC and internally focused

**Culture**
Risk seen as a performance driver

**Goal**
Report and control EC

**Current benchmark practice**

Traditional EP limits integration

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*"Risk is a strategic enabler"*

**Integrated view of risk and value**

**Risk measure**
Integrated, value-based measure

**Drivers**
Key internal and external forces

**Culture**
Risk-aware

**Goal**
Risk integral part of business practices

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**Level of Risk Awareness**
*Moving from risk aversion to value*

Primary focus is to remove all risk
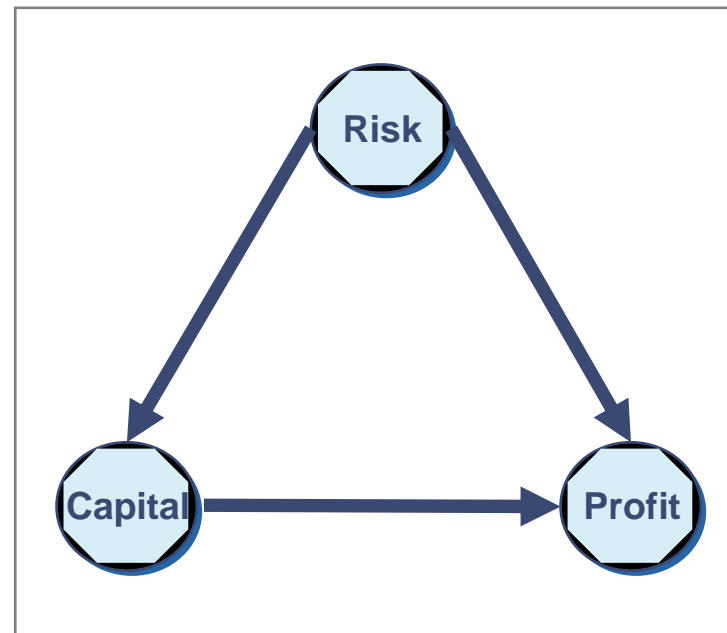
Risk is seen as a cost to be driven down

Risk is to be optimised with profit

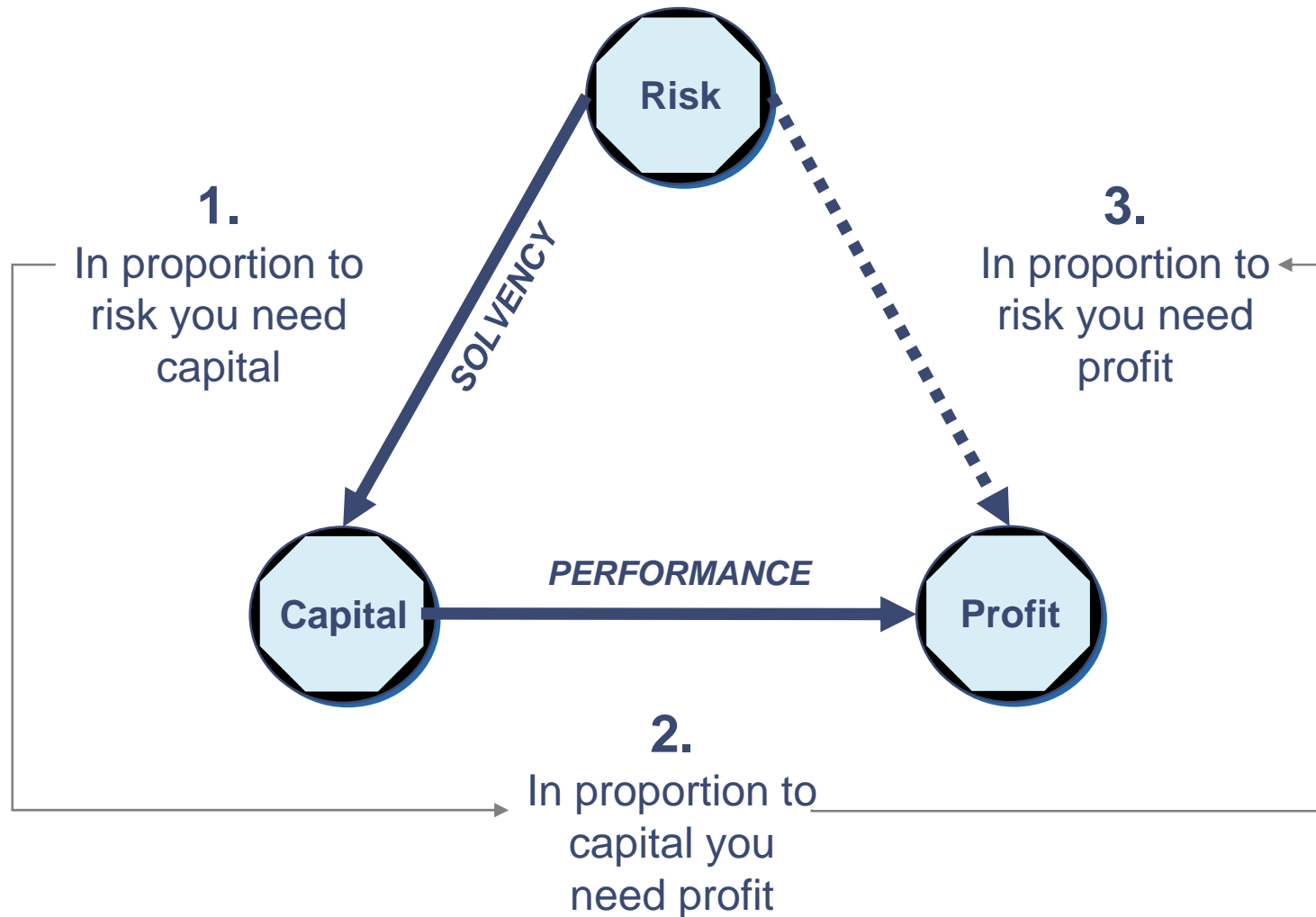# The need for a better measure of Economic Profit

Performance measures need to be linked to the investor's (market valuation) perspective

**Key issues:**

1. The problems with current approaches to Economic Profit .

2. The need to look at performance from a valuation perspective

# The current orthodoxy is not justified economically

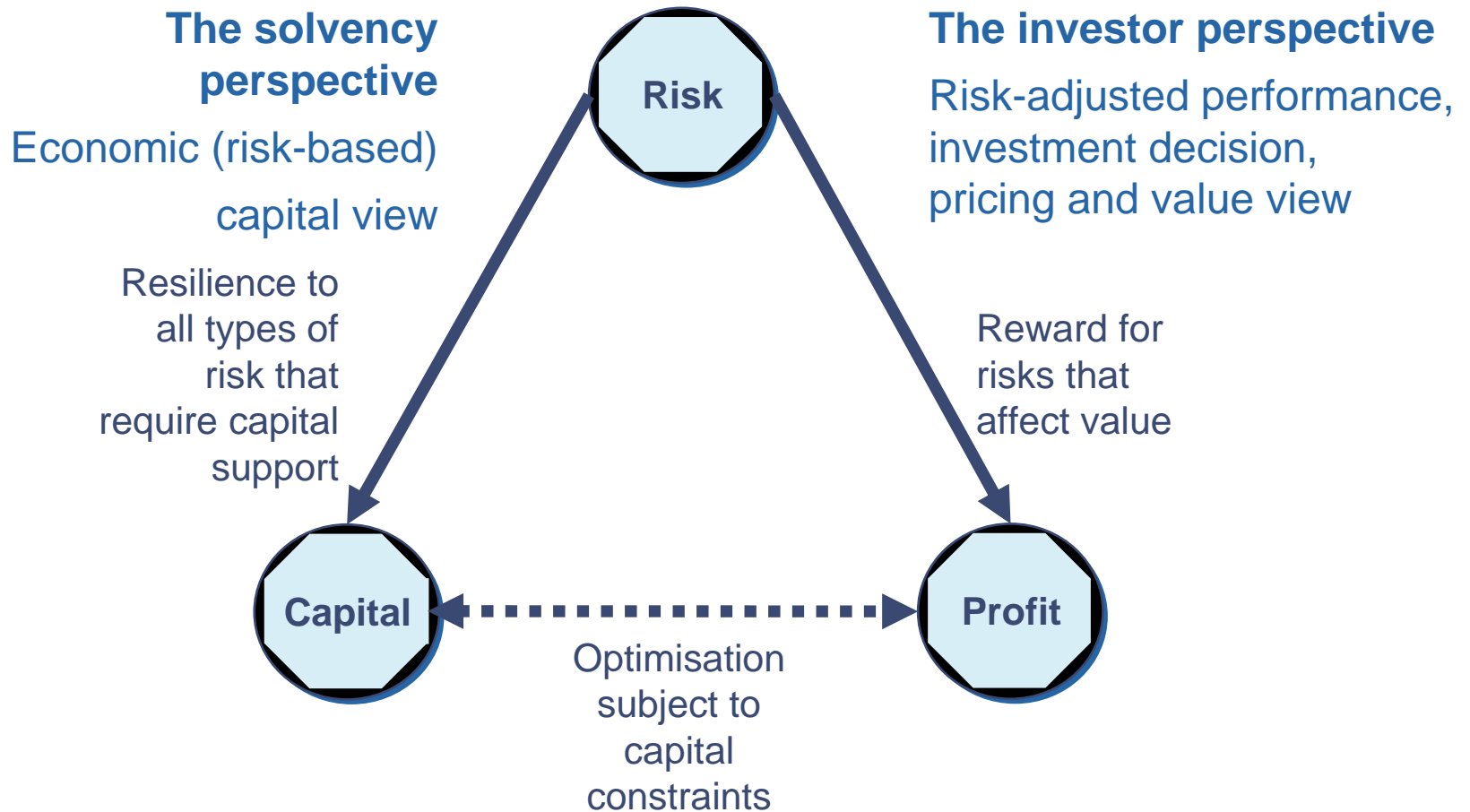# The traditional measure of Economic Profit presents a problematic situation

In the traditional view, profit is charged for risk via:

**Economic profit** = **profit** _minus_

a capital charge of

**risk based capital** _times_ **cost of capital**

Key problems with this definition are:

- Risk based capital and cost of capital are inter-related through gearing, so that for example as capital reduces, the cost of capital increases

- The cost of capital should vary by business unit due to mix of risk (but how?)

- Capital charges made against individual business units do not add up to the Group capital charge unless a problematic and contentious "diversification benefit" is addressed (but how?)

# A market-consistent valuation perspective on risk and reward

**The solvency perspective**

Economic (risk-based)

capital view

Resilience to all types of risk that require capital support

**The investor perspective**

Risk-adjusted performance, investment decision, pricing and value view

Reward for risks that affect value

**Risk**

**Capital**

**Profit**

Optimisation subject to capital constraints

# Market Consistent Economic Profit (MCEP)

PwC's MCEP is a breakthrough concept, allowing a proper separation of value into its risk-free and risk components
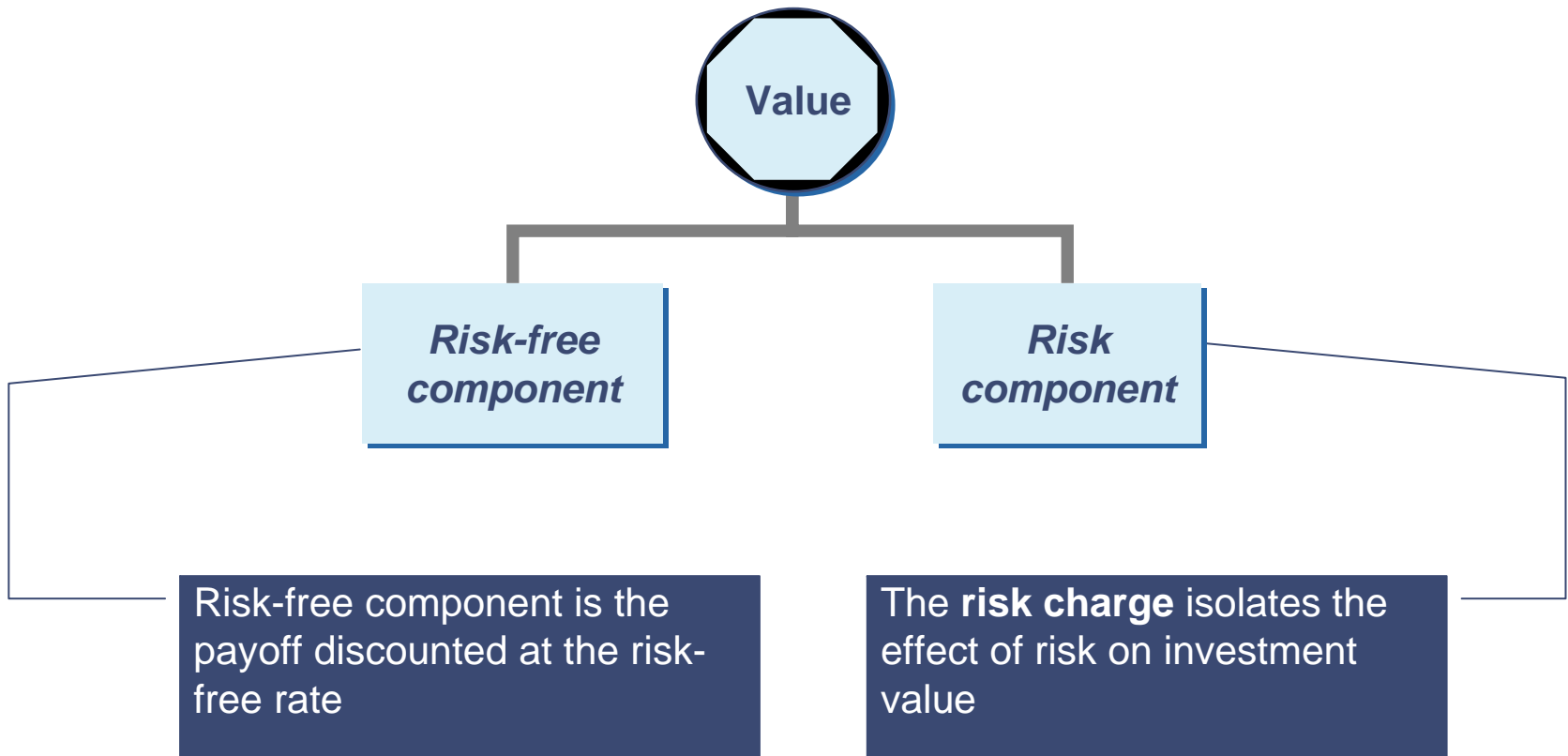
**Key issues:**

1. Building blocks of MCEP
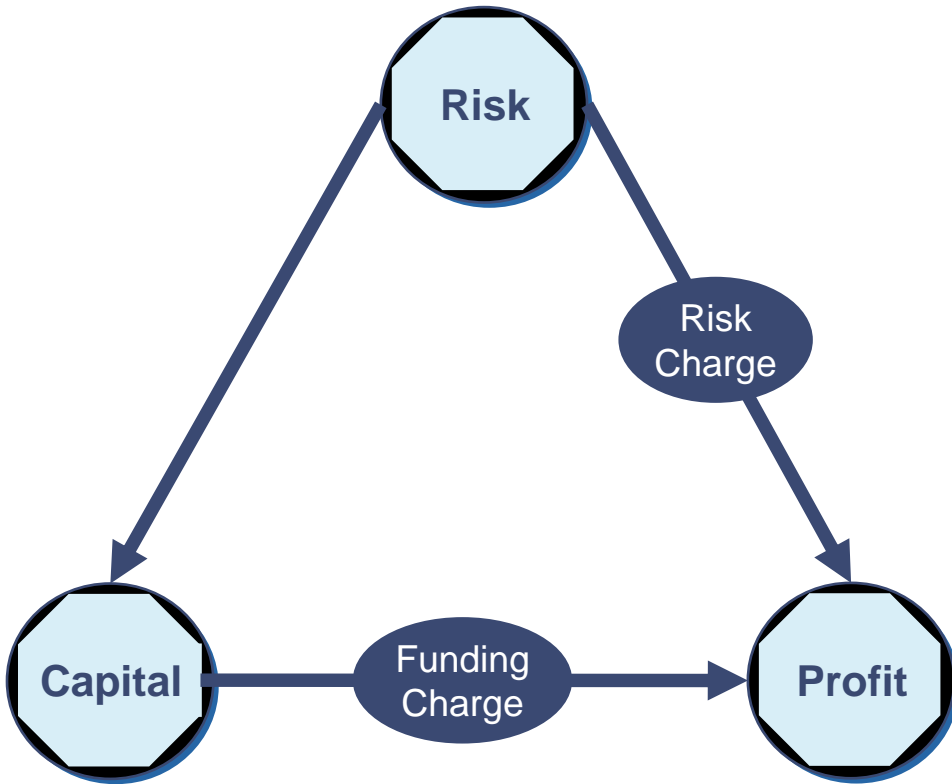
2. The theoretical break through underpinning the approach.

Value
├─ Risk-free component
└─ Risk component
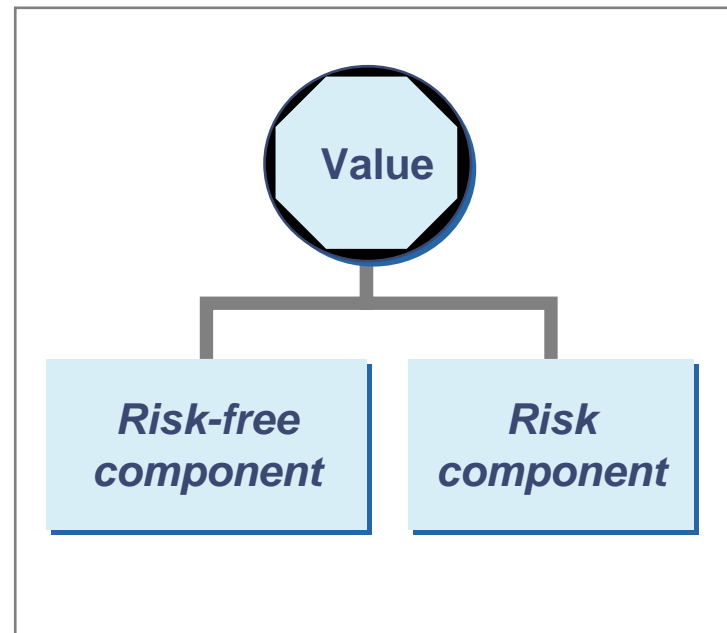
# This leads to consideration of the properties of a sound Economic Profit measure

| Additive | EP can be added together across any dimension of a business to produce Group EP. |
|---|---|
| Scaleable | EP can be measured at any level across a business. |
| Integrated | EP can be related to a meaningful concept of value, for example a market consistent economic value. |
| Rigorous | EP is underpinned by a pricing framework that is based on the market price of risk and capital. |

# PwC's MCEP is a breakthrough concept, allowing a proper separation of value into its risk-free and risk components

**Value**

**Risk-free component**

**Risk component**

Risk-free component is the payoff discounted at the risk-free rate

The **risk charge** isolates the effect of risk on investment value

# Market Consistent Economic Profit



**MCEP** = **Profit**

*less*

a **Risk charge**

*less*

a **Funding charge**
equal to the risk-free
rate times capital.

# MCEP Technical Details - The concept of a stochastic discount factor…

Modern asset pricing theory is cast in terms of *stochastic discount factors.* These are marginal rates of substitution between consumption at the start and end of a period and they allow assets (such as a business unit) to be priced as follows:
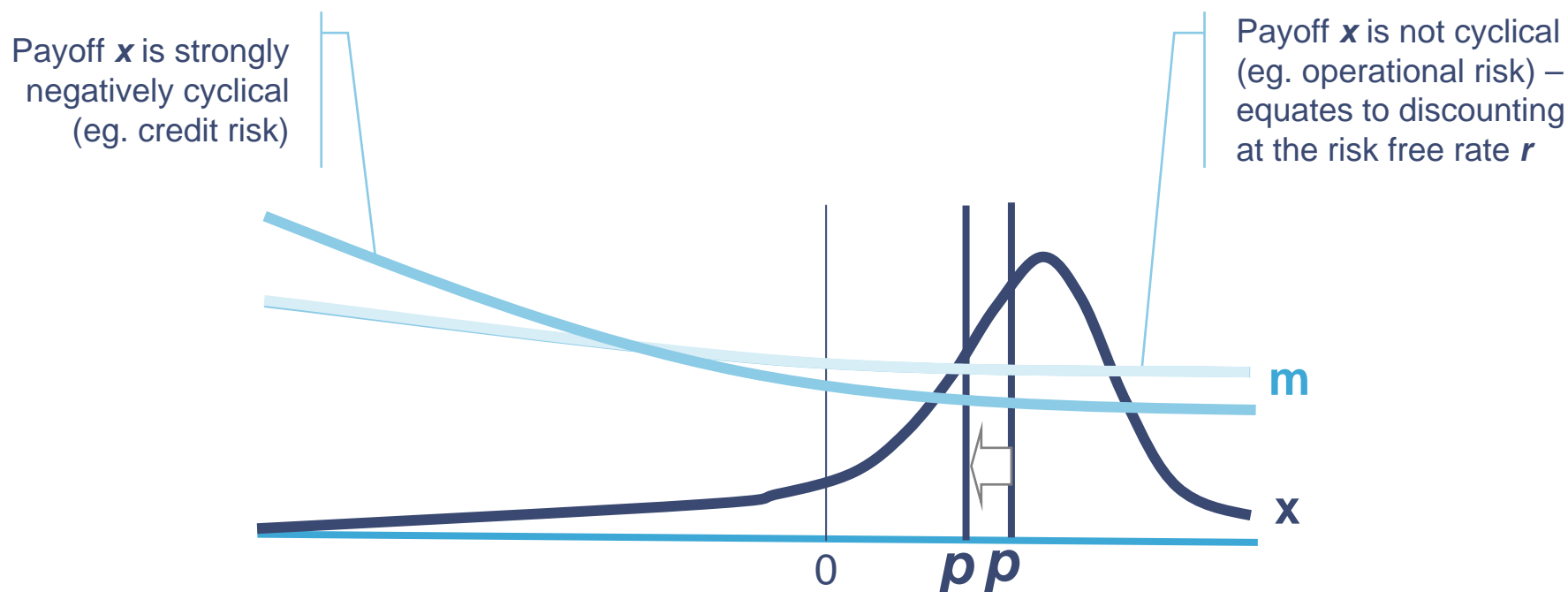
$$p = E(m\,x) \qquad\qquad *$$

where     **p**        is economic value of the asset

            **x**        is the payoff of the asset (a random variable),

            **m**        is the stochastic discount factor applying given the state of consumption at the time (another random variable).

*  E $(m\,x)$ denotes the expected value of the product of $m$ and $x$.

# MCEP Technical Details - Stochastic discount factors differentiate the price of risk

The discount factor $m$ co-varies negatively with consumption, so that adverse payoffs when consumption is depressed are given greater weight than favourable payoffs when consumption is buoyant.

Payoff $x$ is strongly negatively cyclical (eg. credit risk)

Payoff $x$ is not cyclical (eg. operational risk) – equates to discounting at the risk free rate $r$



m

x

0    $p$ $p$

# MCEP Technical Details – Economic Profit measures the change in the market consistent economic value of the payoff

**MCEP** is a fully risk-adjusted multi-period measure of economic profit.

It can be discounted at the risk-free rate, unlike traditional economic profit.

$$\text{MCEP} = p_1 / (1 + r) - p_0$$
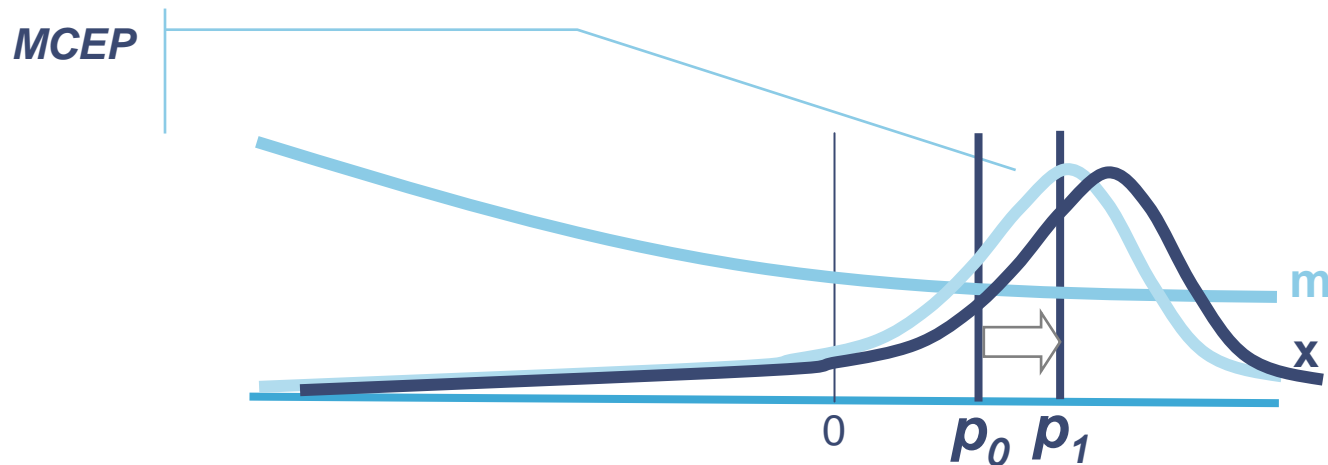
# MCEP Technical Details - MCEP

**Market Consistent Economic Profit**

= **profit**

*less* the **risk charge***

*less* the **funding charge**
(equal to the *risk-free rate*
times the opening value**)

**MCEP**

= P

$+ (1 + r)\ \text{covar}\ (m, x)$

$-\ p\, r$

| Additive | **MCEP** is **additive**: the sum of the results across all business units adds to the Group result |
|---|---|

\* the covariance of m and x is typically negative

\*\* in practice funding charges are often based on net assets

# MCEP Technical Details - The concept of a value driver…

Value Drivers are key significant random variables on which the payoff *x* (in this context profit) depends.

- The randomness in the value drivers are often correlated because of systematic risk – particularly risks related to the economy.

- To apply the SDF to a particular asset, the correlations of the value drivers to growth in consumption needs to be determined.

- Value Drivers can be calibrated using a simple financial model of the business eg. budgeting models

- For example, the most important random variable may be *Revenue*, which depends on the value drivers *New Business Acquisition* and *Customer Retention*.
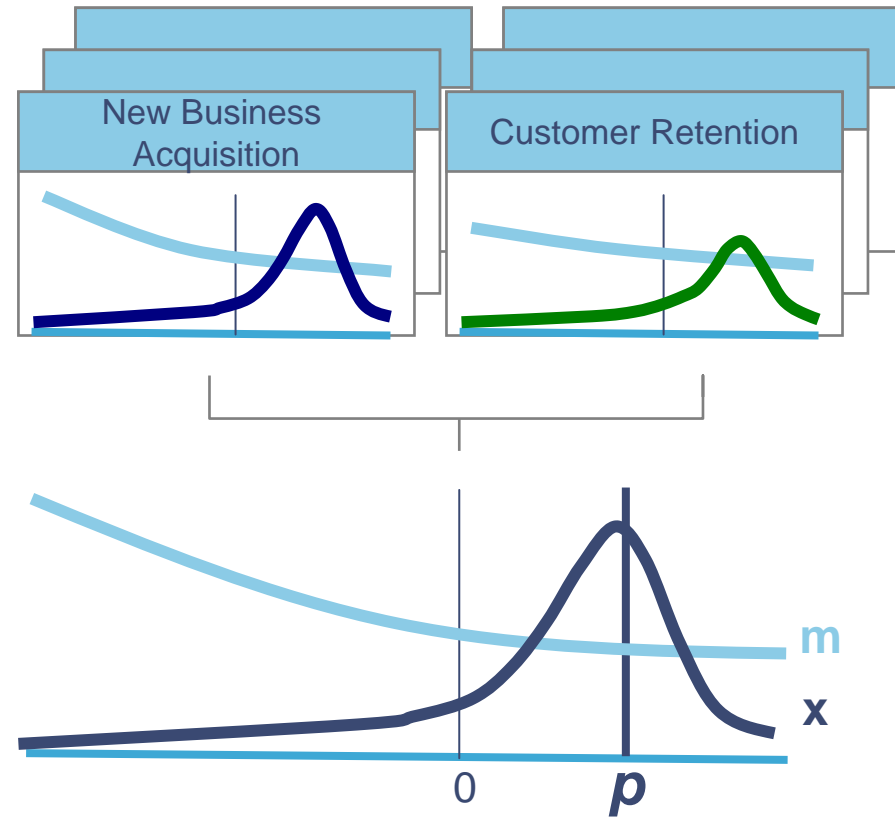
# MCEP Technical Details - the PWC Risk Charge formula

PwC has developed a closed-form solution for the Risk Charge in both a single-period and multi-period setting, under the following simplifying assumptions:

- Constant Relative Risk Aversion utility to specify *m*.

- Value drivers are expressed as growth rates in the payoff *x* (growth in profit)

- Value driver growth rates are lognormal and independently and identically distributed from period to period, and the weights (effect on profit) attaching to the value drivers are constant.

-  The business cash flows continue indefinitely in a multi-period setting, which is suitable for practical purposes because the calculation is re-based each year using parameters that are suitable at the time.

This formula-based approach* makes MCEP very straightforward to put into practice.

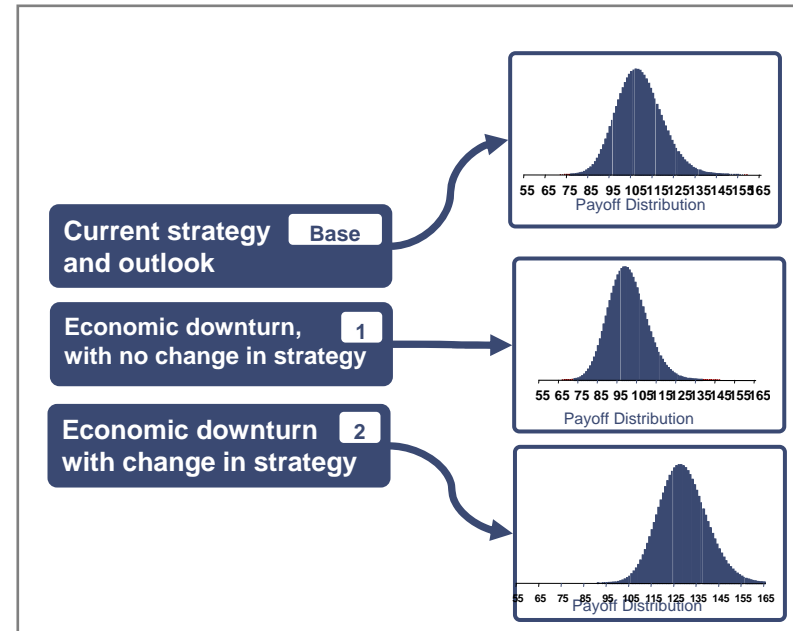* The formula and the details of its derivation are made available on a commercial-in-confidence basis to clients who use MCEP

# Industry case study and benefits

Drilling down on MCEP and the insights it provides to a residential mortgage portfolio.

**Key issues:**

1. Establishing the conditions for understanding the benefits of MCEP.

2. Examining the outcomes for a residential mortgage portfolio.

Current strategy and outlook   **Base**

Economic downturn, with no change in strategy   **1**

Economic downturn with change in strategy   **2**

Payoff Distribution

# Establishing the conditions for realising the benefits

## Approach

We illustrate the method with an example of a stand-alone mortgage business with a small set of key value drivers.

The specific choices of drivers and inputs in the example are illustrative but drawn from Australian banking experience.

The method can accommodate any choice of drivers and inputs and the example is designed to demonstrate its simplicity.

## Steps required

*The method requires the following steps:*

Identify the key value drivers in each business unit, and the risk factors they are subject to.

For each key value driver, forecast the:

- expected total return
- variability of the return
- contribution to the overall return
- correlations between the
    - driver returns
    - driver returns and the market return

Calculate MCEP™

## Value Drivers of the Mortgage Business

For the stand-alone mortgage business we focus on the value of the business at the end of a one-year investment horizon and work with the following key value drivers:

| New Business Volume | Funding | Customer Retention | Credit Quality |

# Modelling the outcomes of different scenarios and outcomes on MCEP

## Key inputs and assumptions

### Overall conditions

| | |
|---|---|
| **Risk Free Rate** | 5% |
| **Investment** | $100 |
| **Time horizon** | 1 year |

### Driver forecasts

| | Expected Growth Rate | Standard Deviation | Weights |
|---|---|---|---|
| New Business Volume | 1.15 | 0.20 | 0.25 |
| Funding | 1.05 | 0.10 | 0.30 |
| Customer retention | 1.10 | 0.10 | 0.30 |
| Credit Quality | 0.98 | 0.10 | 0.15 |

### Correlations

| | New Business Volume | Funding | Customer retention | Credit Quality | Market Portfolio |
|---|---|---|---|---|---|
| New Business Volume | 100% | 20% | 0% | -40% | 30% |
| Funding | 20% | 100% | 30% | 30% | 20% |
| Customer retention | 0% | 30% | 100% | -20% | -20% |
| Credit Quality | -40% | 30% | -20% | 100% | 60% |
| Market Portfolio | 30% | 20% | -20% | 60% | 100% |

## Scenarios

### Current strategy and outlook — Base
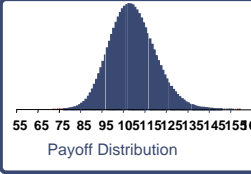
Economic value of the investment is $100

Expected profit for payoff of $107.10

| | | |
|---|---|---|
| Profit | 107.14 - 100 = | $7.14 |
| *less* risk charge | | $1.06 |
| *less* funding charge | | $5.00 |

Payoff Distribution

55 65 75 85 95 105 115 125 135 145 155 165

### Economic downturn, with no change in strategy — 1

| | Expected Growth Rate | Standard Deviation | Weights |
|---|---|---|---|
| New Business Volume | 1.00 | 0.20 | 0.25 |
| Funding | 0.90 | 0.10 | 0.30 |
| Customer retention | 1.00 | 0.10 | 0.30 |
| Credit Quality | 0.95 | 0.10 | 0.15 |

Payoff Distribution

55 65 75 85 95 105 115 125 135 145 155 165

### Economic downturn with change in strategy — 2

| | Expected Growth Rate | Standard Deviation | Weights |
|---|---|---|---|
| New Business Volume | 0.13 | 0.00 | 0.00 |
| Funding | 3.07 | 0.00 | 0.00 |
| Customer retention | 0.00 | 0.00 | 0.00 |
| Credit Quality | 0.00 | 0.00 | 0.00 |

Payoff Distribution

55 65 75 85 95 105 115 125 135 145 155 165

## Outcomes

**MCEP = $1.08**

**Zero or positive MCEP denotes an appropriate level of reward for time and risk**
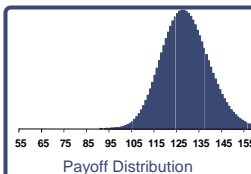
**MCEP = ($10.39)**
Economic value is **$90**, a loss of **$10** on the initial investment

**Need to change strategy**

**MCEP = ($3.87)**
Economic value is **$96**, an improvement of **$6** compared to no change in strategy

**Need to change operations**

# Modelling the outcomes of different scenarios and outcomes on MCEP

## Driver forecasts

| | Expected Growth Rate | Standard Deviation | Weights |
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| Funding | 1.05 | 0.10 | 0.30 |
| Customer retention | 1.10 | 0.10 | 0.30 |
| Credit Quality | 0.98 | 0.10 | 0.15 |

# Modelling the outcomes of different scenarios and outcomes on MCEP

**Key inputs and assumptions**

Overall conditions

Risk Free Rate 5%

Investment

Time horizon

Driver forecasts

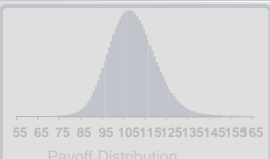| | Expected Growth Rate |
|---|---|
| New Business Volume | 1.15 |
| Funding | 1.05 |
| Customer retention | 1.10 |
| Credit Quality | 0.98 |

Correlations

| | New Business Volume | Fu... |
|---|---|---|
| New Business Volume | 100% | |
| Funding | 20% | 10... |
| Customer retention | 0% | |
| Credit Quality | -40% | 30% |
| Market Portfolio | 30% | 20% |

**Scenarios**

### Current strategy and outlook — Base
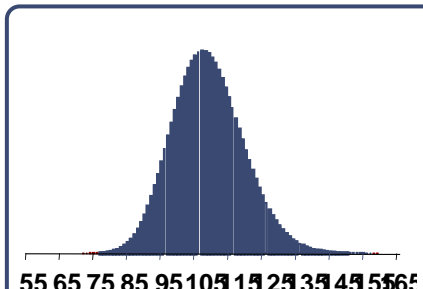
Economic value of the investment is $100

Expected profit for payoff of $107.10

| | | |
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| Profit | 107.10 - 100 = | $7.10 |
| *less* risk charge | | $1.06 |
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Payoff Distribution

55 65 75 85 95 105 115 125 135 145 155 165

## MCEP = $1.08

**Outcomes**

**MCEP = $1.08**

Positive MCEP denotes appropriate level of reward for time and risk

MCEP = ($10.39)
...value is **$90**, a loss of ...initial investment

No change strategy

MCEP = ($3.87)
...mic value is **$96**, an ...ment of **$6** compared to ...in strategy

Need to change operations

# Modelling the outcomes of different scenarios and outcomes on MCEP

**Key inputs and assumptions**

Overall conditions

| | |
|---|---|
| Risk Free Rate | 5% |
| Investment | $100 |
| Time horizon | 1 year |

Driver forecasts

| | Expected Growth Rate | Standard Deviation | Weights |
|---|---|---|---|
| | | | 0.25 |
| Funding | 1.05 | 0.10 | 0.30 |
| Credit Quality | 0.95 | 0.10 | 0.15 |

*Funding stress*

*Restricted Volumes*

*Poorer Credit Quality*

| | New Business Volume | Funding | Customer retention | Credit Quality | Market Portfolio |
|---|---|---|---|---|---|
| New Business Volume | 100% | 20% | 0% | -40% | 30% |
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**Scenarios**

## Economic downturn, with no change in strategy   [1]

| | Expected Growth Rate | Standard Deviation | Weights |
|---|---|---|---|
| New Business Volume | 1.00 | 0.20 | 0.25 |
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**MCEP = ($10.39)**
Economic value is **$90**, a loss of **$10** on the initial economic value

**Outcomes**

$1.08

MCEP denotes level of reward and risk

- - - -

($10.39)
is **$90**, a loss of investment

**change strategy**

- - - -

($3.87)
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**ge operations**

# Modelling the outcomes of different scenarios and outcomes on MCEP

Overall conditions

| | |
|---|---|
| Risk Free Rate | 5% |
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Driver forecasts

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| Funding | 1.05 | 0.10 | 0.30 |
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Funding stress

Restricted Volumes

Poorer Credit Quality

| | New Business Volume | Funding | Customer retention | Credit Quality | Market Portfolio |
|---|---|---|---|---|---|
| New Business Volume | 100% | 20% | 0% | -40% | 30% |
| Funding | 20% | 100% | 30% | 30% | 20% |
| Customer retention | 0% | 30% | 100% | -20% | -20% |
| Credit Quality | -40% | 30% | -20% | 100% | 60% |
| Market Portfolio | 30% | 20% | -20% | 60% | 100% |

## Economic downturn with change in strategy  [2]

| | Expected Growth Rate | Standard Deviation | Weights |
|---|---|---|---|
| New Business Volume | 0.97 | 0.20 | 0.25 |
| Funding | 1.05 | 0.10 | 0.30 |
| Customer retention | 1.07 | 0.10 | 0.30 |
| Credit Quality | 1.00 | 0.10 | 0.15 |

**MCEP = ($3.87)**
Economic value is **$96**, an improvement of **$6** compared to no change in strategy

$1.08

MCEP denotes level of reward and risk

($10.30)

Restricted Volume but fund on-balance sheet

Segmentation to pursue higher quality customer

Improved credit quality

$6 compared to ...ategy

...ge operations

# MCEP is a major advance in risk-based performance measurement & valuation

The benefits flow from a decision-support framework which is **sound** and **useable:**

| | |
|---|---|
| **Additive** | The risk charge, funding charge and MCEP are **additive** across business units (or other structural dimensions), resolving the confusion and contention around "diversification benefit" when making decisions about reward for risk.<br><br>• Adding a new business unit does not affect the MCEP or risk charge of existing business units |
| **Scaleable** | MCEP is **scalable** - based on fundamental value drivers and the risks thereto, enabling integrated risk & reward decision-making at both group and business unit level. |
| **Integrated** | An **integrated** model of all significant risks is employed – whereas the traditional approach only contemplates interactions between risks as an afterthought.<br><br>• Regulator and shareholder perspectives are clearly separated, but with a common analysis of risk profile. |
| **Rigorous** | is underpinned by a marginal utility pricing framework that produces market consistent risk adjusted values. |

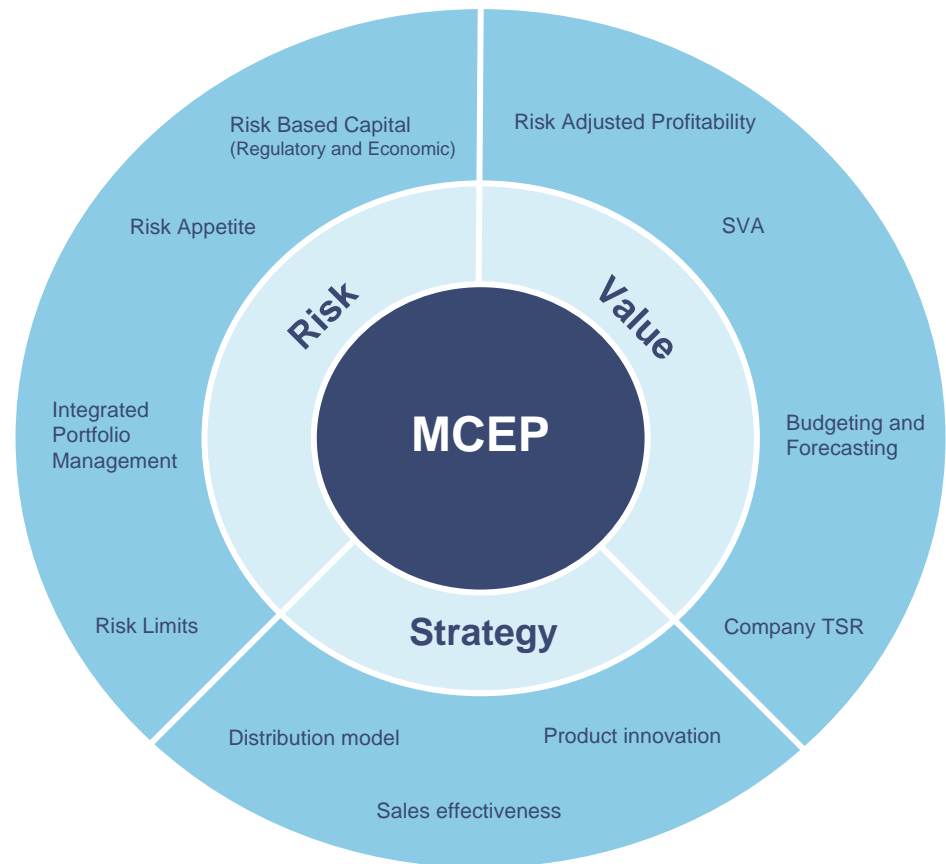# MCEP focuses Risk, Value and Strategy into one complete view of a business's performance

MCEP provides an objective and straightforward approach to risk-adjusted profitability underpinned by breakthrough thinking, at its core:

- Provides management with unique insights on value creation activity and strategies
- Is granular enough to retain relevance at business unit level while providing desirable properties at the top-level of the Firm
- Takes a forward-looking view of the business and
- Is underpinned by a strong technical foundation.

***Most importantly the measurement is not an end in itself – management of value and risk is the key***

**4** key attributes underpin the 3 views of MCEP:

| | |
|---|---|
| **Additive** | can be added together across any dimension of a business. |
| **Scaleable** | can measure at any level across a business. |
| **Integrated** | encapsulates all material effects of risk and capital of a business. |
| **Rigorous** | is underpinned by a marginal utility pricing framework that adapts to business structure. |

# Key contacts

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