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Gross Premium Valuation Pencadangan Premi Bruto

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Today's Presentation

- ❖ **Introduction**
- ❖ **Net Premium Valuation – Advantages and Drawbacks**
- ❖ **Gross Premium Valuation and its Implications**
- ❖ **Recent Development**





Introduction



Purpose of the Valuation

- ❖ **Put a value on the insurance company's obligations**
- ❖ **For the purpose of determining solvency – includes margins to recognise the nature of the obligations (indeterminate and/or volatile)**
- ❖ **For the purpose of recognition of profit and how profit emerges over the term of the insurance contract (capitalised at the outset, proportionately over the duration of the policy, etc)**



Profit and Loss consideration

- ❖ **Premiums are incurred upfront (single contribution) or over the duration of the contract (throughout or limited)**
- ❖ **Claims on the other hand are uncertain as to its incidence or quantum (surrender value, death claims etc)**
- ❖ **Additional complication arises when there is profit sharing among policyholders. In such cases how do profits emerge and how much is declared and distributed?**





Simple guaranteed contracts

- ❖ **Whole Life non profit**
- ❖ **Endowment non profit**
- ❖ **Non profit riders**

The above contracts are straightforward assurance contracts where all profits and losses are for the account of the insurance company. Valuation consideration are more for profit emergence and solvency requirements.





Participating life insurance contracts

- ❖ **Reversionary bonus**
- ❖ **Terminal bonus**
- ❖ **Cash Dividend policies**

Different kinds of participating policies result in different required “surplus emerging” profile. The valuation methodology directly affects how such surpluses emerges.





MARSH MERCER KROLL
GUY CARPENTER OLIVER WYMAN

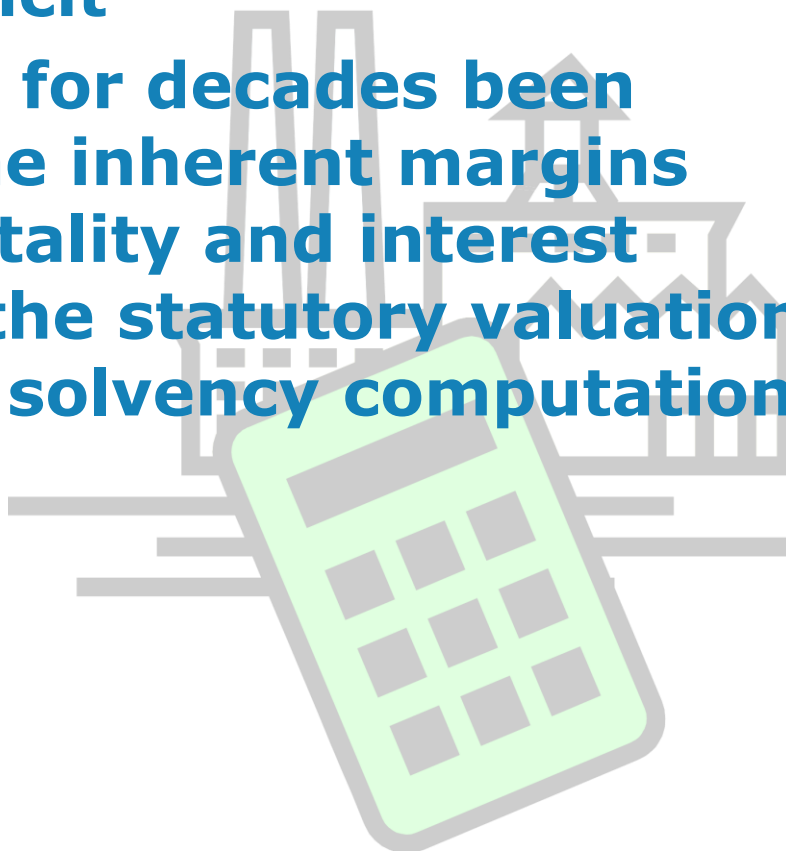


Net Premium Valuation



Net Premium Valuation

- ❖ Independent of pricing assumptions
- ❖ Margins are therefore by default, implicit rather than explicit
- ❖ Regulators have for decades been dependent on the inherent margins (prescribed mortality and interest assumption) in the statutory valuation as one “leg” of the solvency computation





Net Premium Valuation

❖ **Emergence of surplus is dependent on;**

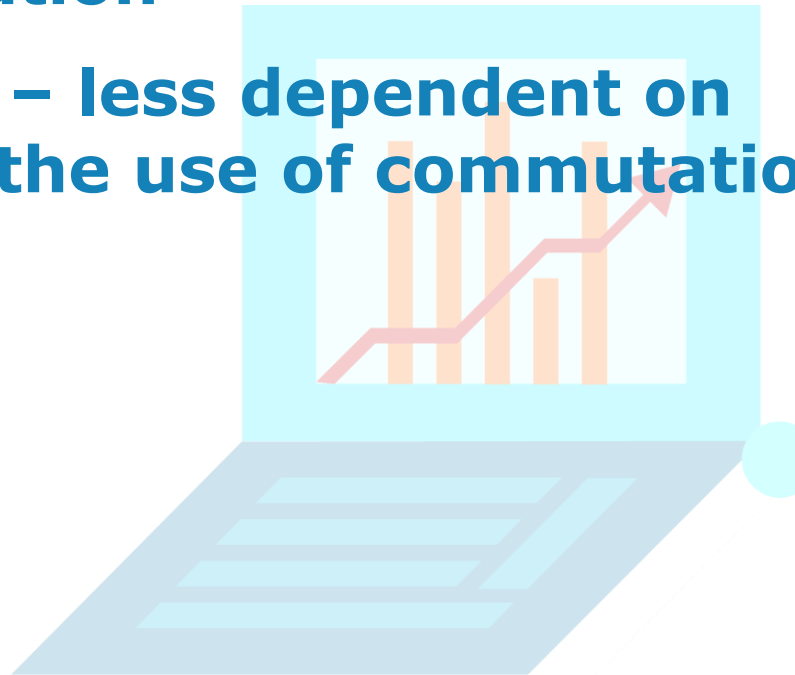
- Differences between office premium and net premium
- Incurred expenses
- Assumptions on mortality and investment and actual experience
- Lapse and surrender experience and how benefit payout in such instances compare to the net premium reserve. Lapse and surrender profits are not capitalised in the valuation process.

❖ **Pricing and surrender value determination in a net premium environment are normally done on a formula basis**



Advantages of Net Premium Valuation

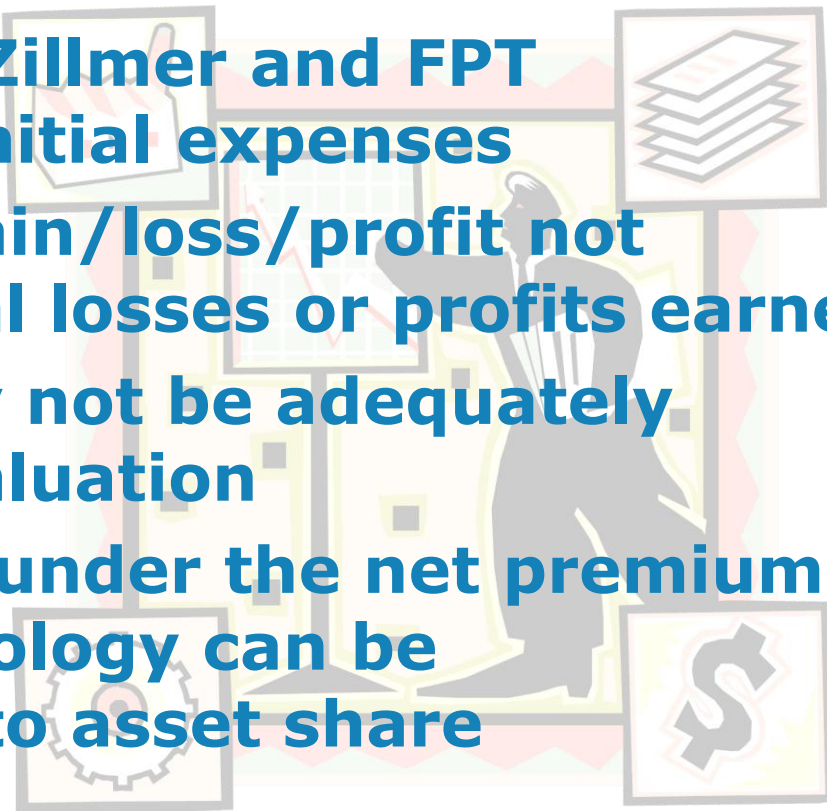
- ❖ **Uniform between companies (to the extent it is regulated by law)**
- ❖ **As it is independent of office premium less room for “manipulation”**
- ❖ **Simple to compute – less dependent on computers, allows the use of commutation factors**





Disadvantages of Net Premium Valuation

- ❖ **Independent of office premium – issues of net premium being greater than office premium**
- ❖ **Imperfections of Zillmer and FPT adjustments for initial expenses**
- ❖ **Emergence of strain/loss/profit not reflective of actual losses or profits earned**
- ❖ **Future bonus may not be adequately captured in the valuation**
- ❖ **Surrender values under the net premium valuation methodology can be disproportionate to asset share**



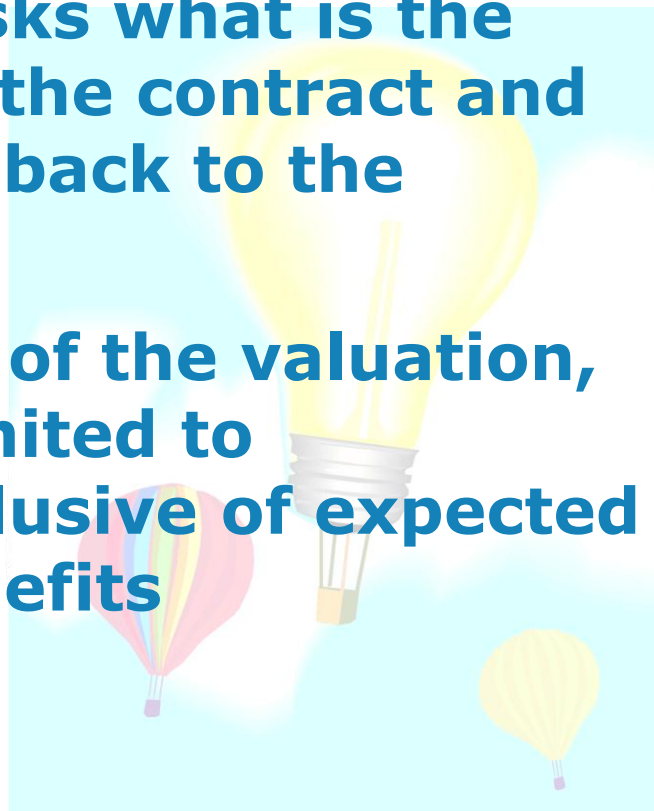


Gross Premium Valuation



The idea behind gross premium valuation

- ❖ **Retains the “prospective” nature of valuing contracts**
- ❖ **Simply said, the method asks what is the expected cashflows under the contract and discounts these cashflows back to the balance sheet date**
- ❖ **Depending on the purpose of the valuation, cashflows can either be limited to guaranteed benefits or inclusive of expected future non guaranteed benefits**

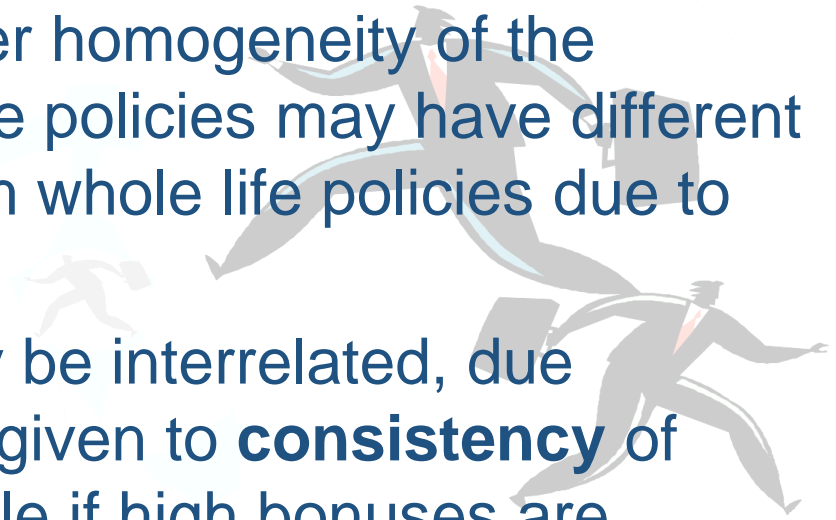




How are the assumptions determined?

❖ Demographic Assumptions

- Look at “best estimates”
- Assumptions should differ depending on the type of policies. Need to consider homogeneity of the policies. Endowment type policies may have different mortality experience from whole life policies due to self selection, etc.
- Where assumptions may be interrelated, due consideration should be given to **consistency** of assumptions. For example if high bonuses are assumed, there should be lower lapses.





How are the assumptions determined?

❖ Financial Assumptions

- Consider duration and expected return on underlying assets.
- Where assets and liabilities are mismatched, **and assuming positive cashflows**, consider expected return on future investments (on future premiums and maturing investments not needed to pay benefits)
- Where assumptions may be interrelated, due consideration should be given to **consistency** of assumptions. For example if high investment returns are assumed then higher bonuses should be projected and perhaps also higher inflation rate.



Implications of the valuation methodology

- ❖ Nature of the valuation results in the **immediate capitalisation** of the differences between the valuation assumptions and the pricing assumptions
 - Investment
 - Mortality
 - Expenses
 - Bonuses
 - Profit on surrenders/lapses
- ❖ Because of this capitalisation, and for regular premium products, negative reserves can result which may be imprudent if assumptions are not realised.
- ❖ Such negative reserves can be avoided if provision is also made for future profit transfer to shareholders, eg through “margins for services”





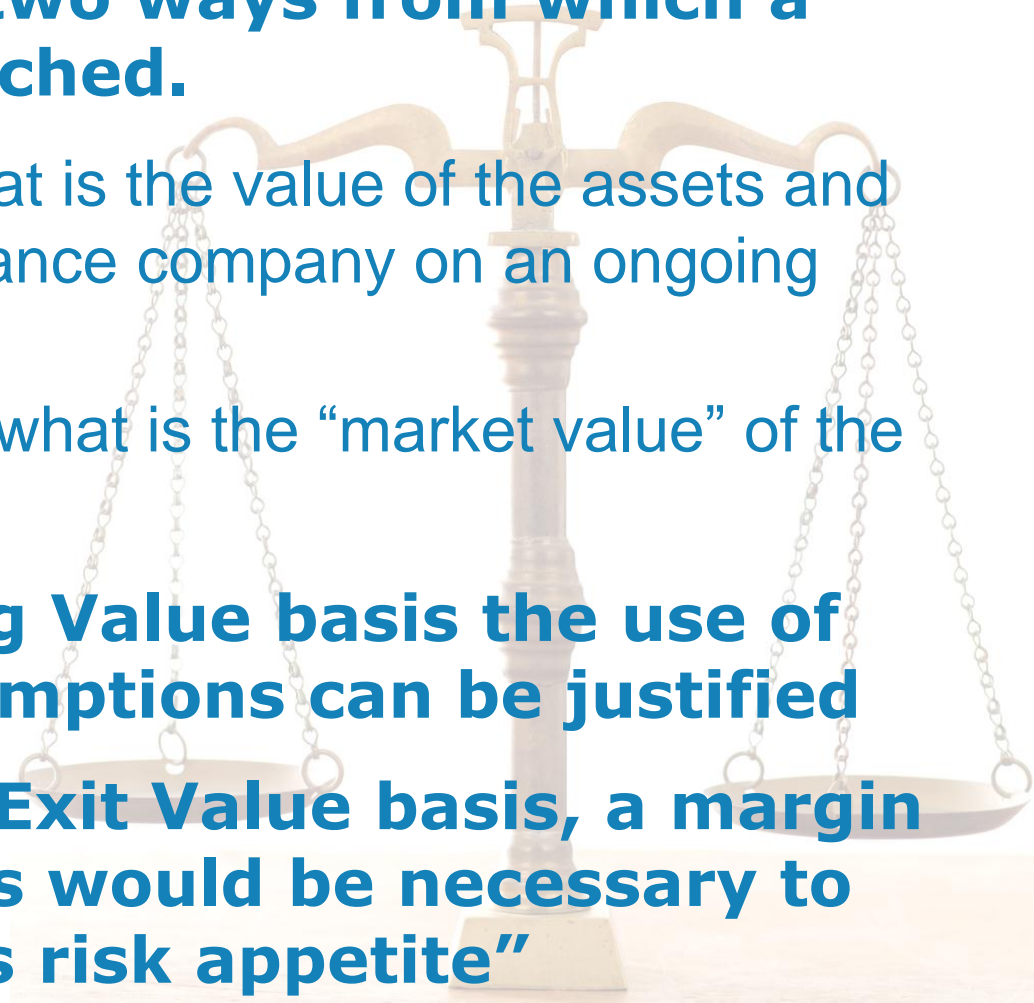
Implications of the valuation methodology

- ❖ **Results of successive valuations can vary significantly due to changes in assumptions due to the capitalisation of the differences in assumptions**
- ❖ **Results are therefore easier to “manipulate” if assumptions are not subject to independent external reference points**
- ❖ **Assets are taken at market values (example of an external reference point)**
- ❖ **Underlying assumption that assets and liabilities are “consistently valued” more theory driven rather than real.**



Can there only be one set of valuation assumptions under the GPV?

- ❖ **There are at least two ways from which a GPV can be approached.**
 - On-going value – what is the value of the assets and liabilities to the insurance company on an ongoing basis
 - Current Exit Value – what is the “market value” of the assets and liabilities
- ❖ **Under the On-going Value basis the use of best estimate assumptions can be justified**
- ❖ **Under the Current Exit Value basis, a margin on the assumptions would be necessary to reflect the “buyer’s risk appetite”**





GPV from the Regulator's perspective

- ❖ **Unlikely that the Regulator will be happy to accept GPV with no margins as the Regulator is concern with solvency**
- ❖ **GPV allows the Regulator to predetermine the explicit level of prudence in the valuation. Best Estimate (one in two years of sufficiency) is replaced with say, a "75th percentile" sufficiency (three in four years of sufficiency)**
- ❖ **Where guaranteed benefits are valued, discount rates are fixed with reference to government bonds of matching duration regardless of the actual underlying assets**

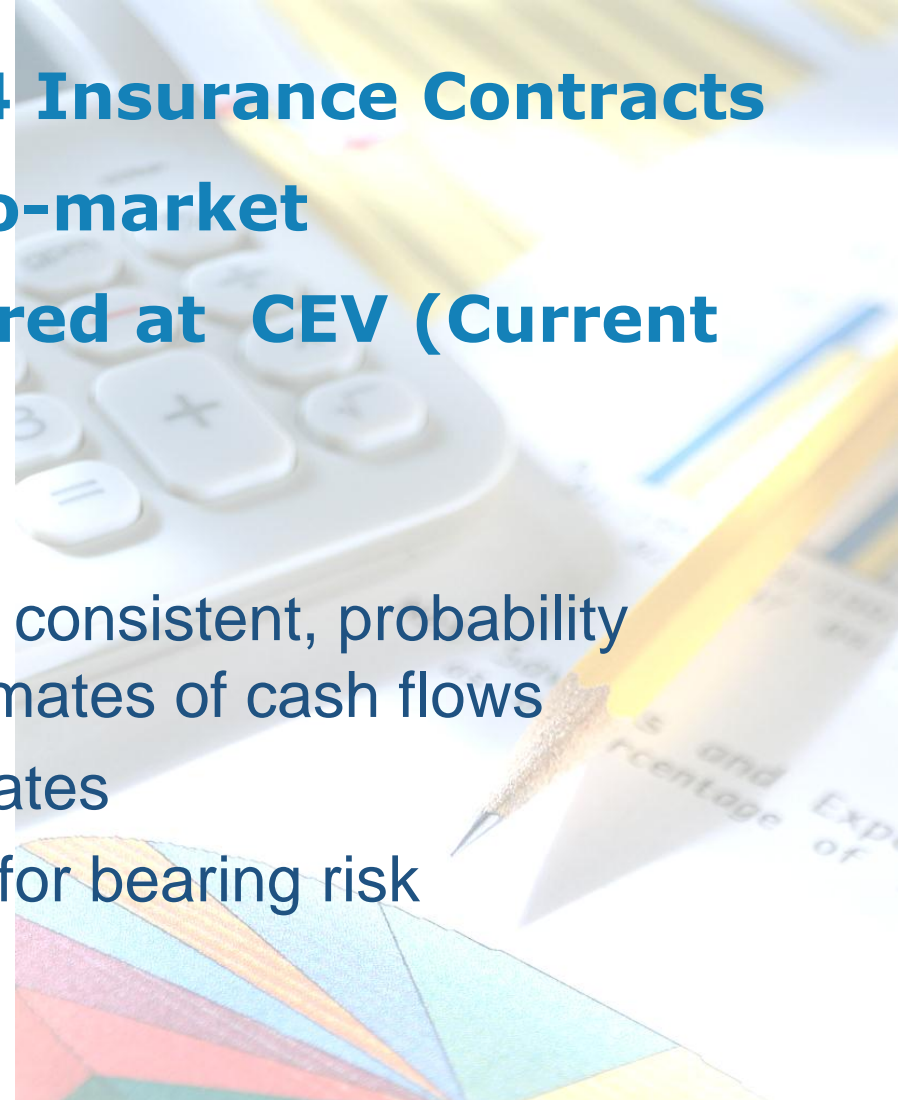


Recent Developments



International Accounting Standards

- ❖ **Development of IFRS 4 Insurance Contracts**
- ❖ **Assets to be marked-to-market**
- ❖ **Liabilities to be measured at CEV (Current Exit Value)**
- ❖ **Three building blocks:**
 - Explicit, unbiased, market consistent, probability weighted and current estimates of cash flows
 - Current market discount rates
 - Explicit, unbiased margin for bearing risk





Modern Theory of Financial Economics

- ❖ **“No Arbitrage” Principle**
- ❖ **Insurance as a “Financial Derivative”**
- ❖ **Value of insurance liabilities needs to be “market-consistent”**
 - Use of market observable prices e.g. risk-free yields as a basis for discount rates
 - Market consistent variables e.g. outsourcing costs as expense basis
 - Parameters should not contradict with market prices



International Development

- ❖ **Singapore adopted RBC in 2006**
- ❖ **Malaysia to implement RBC 1st January 2009**
- ❖ **European Solvency II target implementation 2012 (after several deferments)**
- ❖ **IFRS 4 target implementation 2012**





RBC in the Region

❖ Similar features of the Malaysia's and Singapore's RBC:

- Gross Premium Valuation with government bond yields as discount rate for guaranteed benefits, fund based yields for participating liabilities
- Assets marked-to-market
- Factor based risk charges on assets and liabilities to reflect required solvency margin
- Internal capital target to supplement supervisory minimum CAR





Thank You!

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Appendix 1 Net Premium Valuation



Net Premium Valuation (NPV)

- ❖ **NPV Reserves = PV future contractual liabilities less PV future net premiums**
- ❖ **Net premium = premium that provides contractual benefits (at policy commencement) under valuation basis, payable under the same condition as office premium**
- ❖ **Only for mortality and interest are explicitly allowed**
- ❖ **Additional adjustments are required**
- ❖ **Assets typically valued at book**



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- A hand is holding a document that features a bar chart with blue and yellow bars. The chart has a legend with a blue square labeled 'Income' and a yellow square labeled 'Expenses'. The x-axis of the chart is labeled with dates: 01/1997, 05/1997, 09/1997, 01/1998, 05/1998, 09/1998, 01/1999, 05/1999, 09/1999, 01/2000, 05/2000, 09/2000, 01/2001, 05/2001, 09/2001, 01/2002, 05/2002, 09/2002, 01/2003, 05/2003, 09/2003, 01/2004, 05/2004, 09/2004, 01/2005, 05/2005, 09/2005, 01/2006, 05/2006, 09/2006, 01/2007, 05/2007, 09/2007, 01/2008, 05/2008, 09/2008, 01/2009, 05/2009, 09/2009, 01/2010, 05/2010, 09/2010, 01/2011, 05/2011, 09/2011, 01/2012, 05/2012, 09/2012, 01/2013, 05/2013, 09/2013, 01/2014, 05/2014, 09/2014, 01/2015, 05/2015, 09/2015, 01/2016, 05/2016, 09/2016, 01/2017, 05/2017, 09/2017, 01/2018, 05/2018, 09/2018, 01/2019, 05/2019, 09/2019, 01/2020, 05/2020, 09/2020, 01/2021, 05/2021, 09/2021, 01/2022, 05/2022, 09/2022, 01/2023, 05/2023, 09/2023, 01/2024, 05/2024, 09/2024, 01/2025, 05/2025, 09/2025, 01/2026, 05/2026, 09/2026, 01/2027, 05/2027, 09/2027, 01/2028, 05/2028, 09/2028, 01/2029, 05/2029, 09/2029, 01/2030, 05/2030, 09/2030, 01/2031, 05/2031, 09/2031, 01/2032, 05/2032, 09/2032, 01/2033, 05/2033, 09/2033, 01/2034, 05/2034, 09/2034, 01/2035, 05/2035, 09/2035, 01/2036, 05/2036, 09/2036, 01/2037, 05/2037, 09/2037, 01/2038, 05/2038, 09/2038, 01/2039, 05/2039, 09/2039, 01/2040, 05/2040, 09/2040, 01/2041, 05/2041, 09/2041, 01/2042, 05/2042, 09/2042, 01/2043, 05/2043, 09/2043, 01/2044, 05/2044, 09/2044, 01/2045, 05/2045, 09/2045, 01/2046, 05/2046, 09/2046, 01/2047, 05/2047, 09/2047, 01/2048, 05/2048, 09/2048, 01/2049, 05/2049, 09/2049, 01/2050, 05/2050, 09/2050, 01/2051, 05/2051, 09/2051, 01/2052, 05/2052, 09/2052, 01/2053, 05/2053, 09/2053, 01/2054, 05/2054, 09/2054, 01/2055, 05/2055, 09/2055, 01/2056, 05/2056, 09/2056, 01/2057, 05/2057, 09/2057, 01/2058, 05/2058, 09/2058, 01/2059, 05/2059, 09/2059, 01/2060, 05/2060, 09/2060, 01/2061, 05/2061, 09/2061, 01/2062, 05/2062, 09/2062, 01/2063, 05/2063, 09/2063, 01/2064, 05/2064, 09/2064, 01/2065, 05/2065, 09/2065, 01/2066, 05/2066, 09/2066, 01/2067, 05/2067, 09/2067, 01/2068, 05/2068, 09/2068, 01/2069, 05/2069, 09/2069, 01/2070, 05/2070, 09/2070, 01/2071, 05/2071, 09/2071, 01/2072, 05/2072, 09/2072, 01/2073, 05/2073, 09/2073, 01/2074, 05/2074, 09/2074, 01/2075, 05/2075, 09/2075, 01/2076, 05/2076, 09/2076, 01/2077, 05/2077, 09/2077, 01/2078, 05/2078, 09/2078, 01/2079, 05/2079, 09/2079, 01/2080, 05/2080, 09/2080, 01/2081, 05/2081, 09/2081, 01/2082, 05/2082, 09/2082, 01/2083, 05/2083, 09/2083, 01/2084, 05/2084, 09/2084, 01/2085, 05/2085, 09/2085, 01/2086, 05/2086, 09/2086, 01/2087, 05/2087, 09/2087, 01/2088, 05/2088, 09/2088, 01/2089, 05/2089, 09/2089, 01/2090, 05/2090, 09/2090, 01/2091, 05/2091, 09/2091, 01/2092, 05/2092, 09/2092, 01/2093, 05/2093, 09/2093, 01/2094, 05/2094, 09/2094, 01/2095, 05/2095, 09/2095, 01/2096, 05/2096, 09/2096, 01/2097, 05/2097, 09/2097, 01/2098, 05/2098, 09/2098, 01/2099, 05/2099, 09/2099, 01/2100, 05/2100, 09/2100, 01/2101, 05/2101, 09/2101, 01/2102, 05/2102, 09/2102, 01/2103, 05/2103, 09/2103, 01/2104, 05/2104, 09/2104, 01/2105, 05/2105, 09/2105, 01/2106, 05/2106, 09/2106, 01/2107, 05/2107, 09/2107, 01/2108, 05/2108, 09/2108, 01/2109, 05/2109, 09/2109, 01/2110, 05/2110, 09/2110, 01/2111, 05/2111, 09/2111, 01/2112, 05/2112, 09/2112, 01/2113, 05/2113, 09/2113, 01/2114, 05/2114, 09/2114, 01/2115, 05/2115, 09/2115, 01/2116, 05/2116, 09/2116, 01/2117, 05/2117, 09/2117, 01/2118, 05/2118, 09/2118, 01/2119, 05/2119, 09/2119, 01/2120, 05/2120, 09/2120, 01/2121, 05/2121, 09/2121, 01/2122, 05/2122, 09/2122, 01/2123, 05/2123, 09/2123, 01/2124, 05/2124, 09/2124, 01/2125, 05/2125, 09/2125, 01/2126, 05/2126, 09/2126, 01/2127, 05/2127, 09/2127, 01/2128, 05/2128, 09/2128, 01/2129, 05/2129, 09/2129, 01/2130, 05/2130, 09/2130, 01/2131, 05/2131, 09/2131, 01/2132, 05/2132, 09/2132, 01/2133, 05/2133, 09/2133, 01/2134, 05/2134, 09/2134, 01/2135, 05/2135, 09/2135, 01/2136, 05/2136, 09/2136, 01/2137, 05/2137, 09/2137, 01/2138, 05/2138, 09/2138, 01/2139, 05/2139, 09/2139, 01/2140, 05/2140, 09/2140, 01/2141, 05/2141, 09/2141, 01/2142, 05/2142, 09/2142, 01/2143, 05/2143, 09/2143, 01/2144, 05/2144, 09/2144, 01/2145, 05/2145, 09/2145, 01/21



Constructing a basis - Interest

- ❖ **Consider the expected yield, term and currency of current portfolio of assets**
- ❖ **Take into account intended long term asset mix and investment outlook**
- ❖ **Allow for reinvestment needs**
- ❖ **Further relevant adjustment for tax**
- ❖ **Particular care for products which reserves are significant e.g. endowment assurance**





Further Adjustments – Initial Expense

- ❖ **Office premium includes a level annual loading for initial expenses and commissions**
- ❖ **This loadings can be capitalised using a Zillmer adjustment (increment) to the net premium**
- ❖ **The NPV reserves would be reduced by the present value of future initial expense loadings**





Further Adjustments – Renewal Expense

- ❖ For regular premium products, the NPV method provides for renewal expenses and commissions implicitly through the difference between office premium and net premium
- ❖ The net premium is typically reduced by adjusting the interest basis
- ❖ For single premium products, an explicit adjustment equal to the present value of future expenses needs to be set aside





Further Adjustments – Lapse

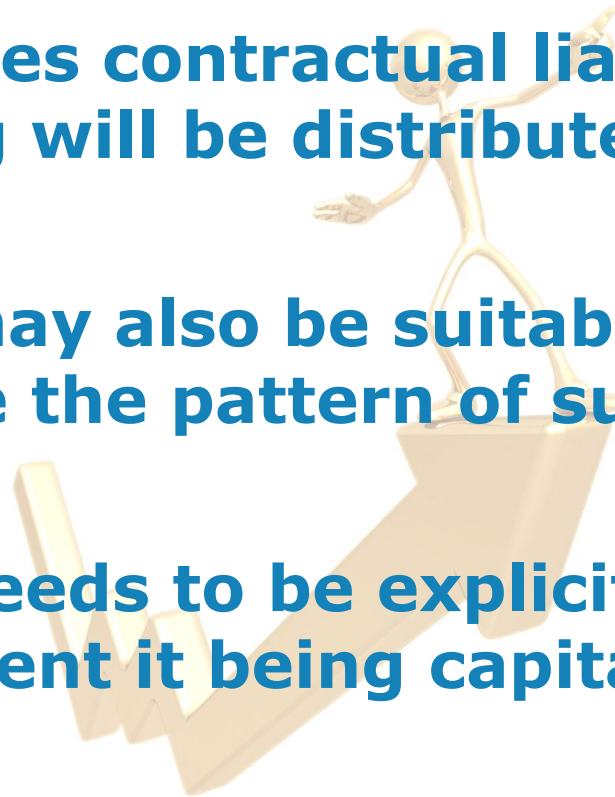
- ❖ **Surrender values are typically calculated on a more stringent basis than reserves**
- ❖ **The NPV method does not allow for lapse decrement which could understate liabilities if surrender value exceeds net premium reserves**
- ❖ **NPV method results higher new business strain for lapse supported products**





Further Adjustments – Bonus

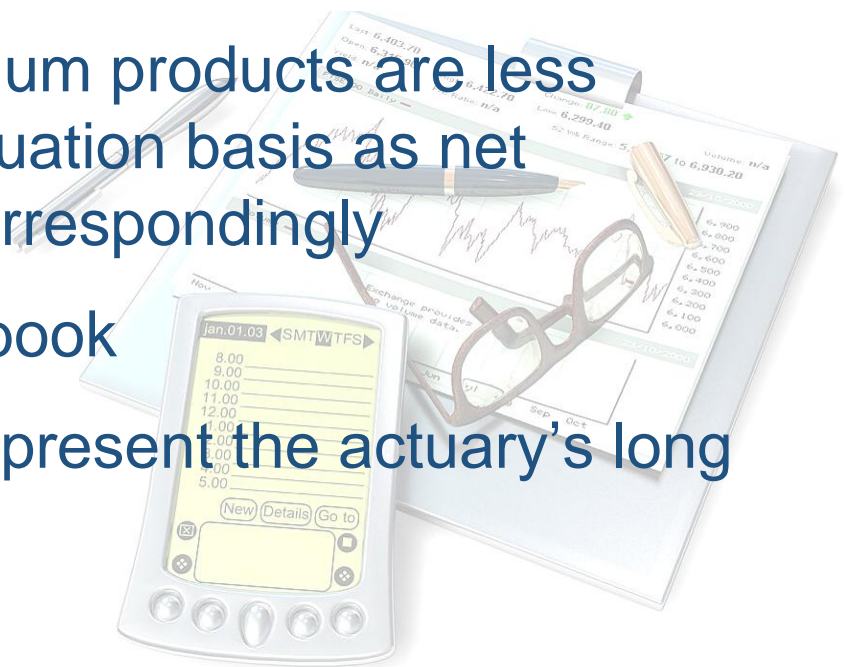
- ❖ **For participating products, the office premium includes a loading for regular and terminal bonuses**
- ❖ **Net premium captures contractual liabilities only, surplus arising will be distributed as regular bonuses**
- ❖ **The interest basis may also be suitably adjusted to enhance the pattern of surplus arising**
- ❖ **Terminal bonuses needs to be explicitly provided for to prevent it being capitalised upfront as profits**





Advantages of the NPV Method

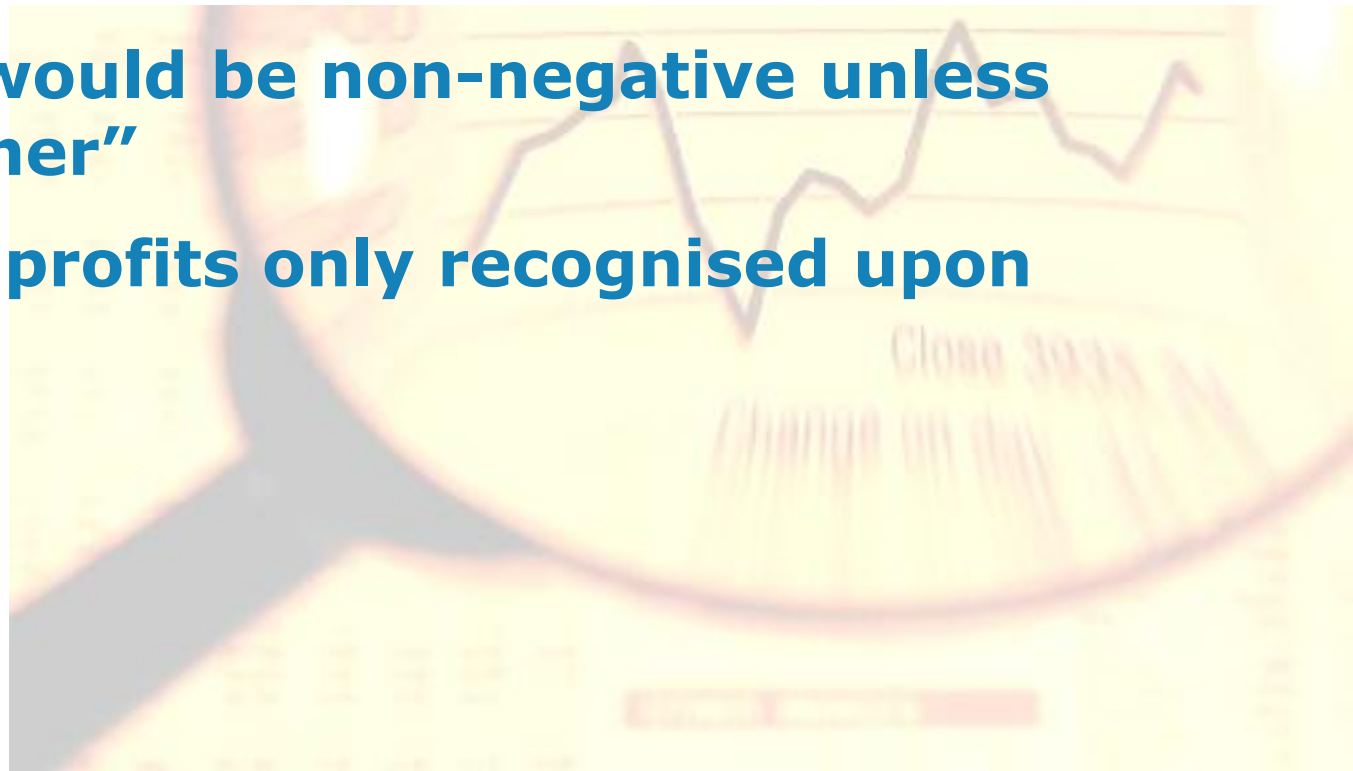
- ❖ **Formula driven with only two parameters – simple to compute**
- ❖ **Less volatile results:**
 - Reserves for regular premium products are less sensitive to changes in valuation basis as net premium will be revised correspondingly
 - Assets typically valued at book
 - Valuation basis typically represent the actuary's long term view





Advantages of the NPV Method

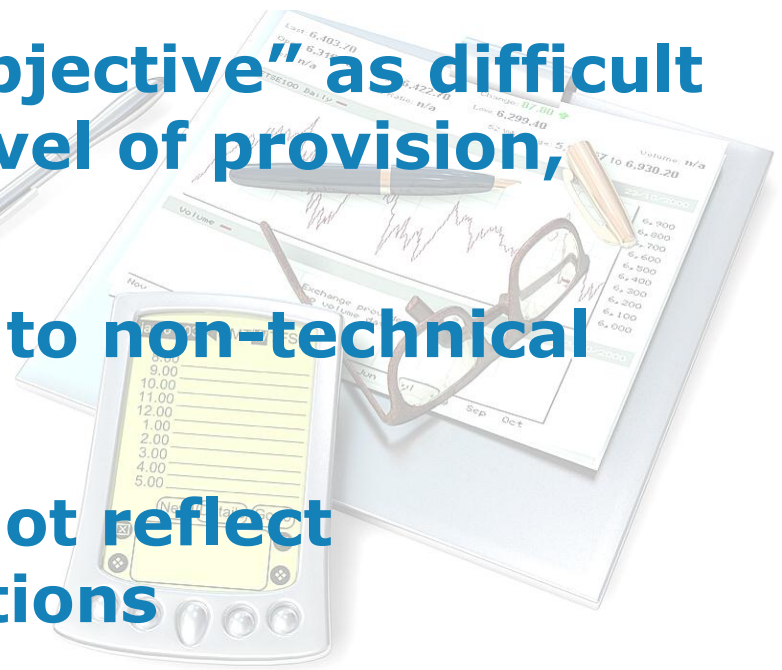
- ❖ **For conventional participating products, future bonuses would emerge gradually as surplus and not capitalised upfront**
- ❖ **Reserves would be non-negative unless “over-Zillmer”**
- ❖ **Surrender profits only recognised upon surrender**





Drawbacks of the NPV Method

- ❖ **Implicit allowances, e.g. bonus and expense makes it difficult to be viewed as “true and fair”**
- ❖ **May be viewed as “not objective” as difficult to quantify sufficiency level of provision, despite overall prudence**
- ❖ **Difficult to communicate to non-technical audience**
- ❖ **Stable results that may not reflect underlying market conditions**





Drawbacks of the NPV Method

- ❖ **Can result in high “artificial” new business strain even for profitable products as surplus would only emerge gradually over policy duration**
- ❖ **Not tailored for sophisticated designs, e.g. out-of-money options, financial reinsurance – additional actuarial judgment and care required**





Appendix 2 Gross Premium Valuation



Gross Premium Valuation (GPV)

- ❖ **GPV Reserves = PV all future liabilities (include expenses and discretionary benefits) less PV future office premiums**
- ❖ **Each parameter requires an explicit assumption**
- ❖ **Assets are typically valued at market**
- ❖ **Discount rates are typically derived from market observable yields – market consistent**



Constructing a Basis – Discount Rate

- ❖ **Common for regulations to prescribed market observable yields to be consistent with assets being valued at market price**
- ❖ **Spot yields of government bonds typically used to discount guaranteed liabilities of similar duration**
- ❖ **Expected yields are arguably more suitable for discounting participating liabilities as it would allow for its discretionary nature and PRE**



Constructing a Basis – Discount Rate

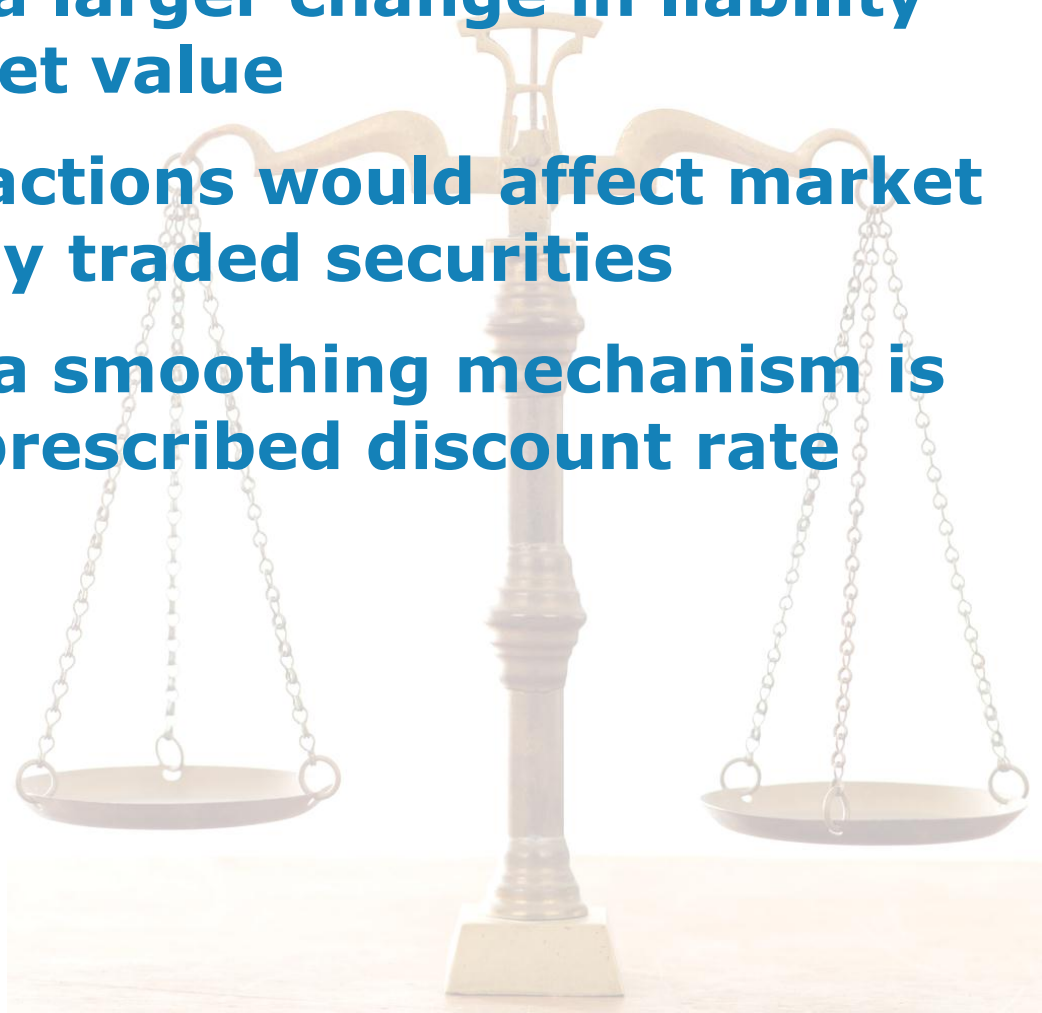
- ❖ **In developing countries, long dated government bonds are scarce in supply and thinly traded**
- ❖ **Life insurers would not be able to invest in bonds of similar duration with its liability profile**
- ❖ **Ideally large issues of long dated government bonds should preclude the market-consistent liability valuation regime**





Constructing a Basis – Discount Rate

- ❖ **Movements in government bond yields would lead to a larger change in liability value than asset value**
- ❖ **Further, transactions would affect market prices for thinly traded securities**
- ❖ **In Singapore, a smoothing mechanism is built into the prescribed discount rate**





Constructing a Basis – Demographics

- ❖ **Market observable prices for demographic factors are non-existent in developing countries**
- ❖ **Historical experience typically used as a starting point, with adjustments to reflect expected future experience**



Constructing a Basis – Expense

- ❖ **Expense allocation between initial and renewal tend to be subjective**
- ❖ **Outsourcing costs may be used as a guide to set future expense assumption**
- ❖ **Expense inflation needs to be consistent with the discount rate used**





Constructing a Basis – Bonus

- ❖ **Future regular and terminal bonus would be explicitly provided for**
- ❖ **The level of bonus would need to be supportable under the reserving basis**
- ❖ **If reserving basis is too stringent and does not support current set of bonus levels, the level of bonus should be consistently reduced in the reserving basis**





Constructing a Basis – Overall Strength

- ❖ **Liabilities based on a set of “best estimate” assumptions i.e. equal probability of over and under reserving would be a starting point**
- ❖ **Reserves would usually be set on a higher sufficiency level by strengthening the reserving basis**
- ❖ **The difference between reserves and best estimate liabilities are typically known as risk margins or PADs (provision for adverse deviations)**



Constructing a Basis – Overall Strength

- ❖ **As an example Bank Negara Malaysia requires reserves to be set at a minimum of 75% sufficiency level**
- ❖ **One possible method is to set each individual assumption at 75% confidence level using statistical distributions**
- ❖ **However, this would overshoot the required 75% sufficiency level of reserves if the correlation between assumptions are not allowed for**



Constructing a Basis – Overall Strength

- ❖ **Another method would be to only strengthen the critical assumption(s) to arrive at the desired sufficiency level of reserves**
- ❖ **E.g. load up mortality assumption for term assurance products and leave other assumptions at best estimate**
- ❖ **Requires extensive testing and actuarial judgment**
- ❖ **Stochastic models are also an option**



Implications of GPV Method

- ❖ **All future cash flows can be modelled – objective, realistic and explicit**
- ❖ **Strength of basis determined explicitly via strength of individual assumptions e.g. able to set 75th confidence level of reserves**
- ❖ **Easier to communicate to non-technical audience**



Implications of GPV Method

- ❖ **Capitalise the difference between pricing and valuation basis at policy inception as profit or loss**
- ❖ **Negative reserves may arise during initial policy durations because of initial expense and profit loadings in office premium**



Implications of GPV Method

- ❖ **Reserves sensitive to change in basis as the change in reserving basis does not affect office premiums**
- ❖ **Any asset liability mismatch would increase volatility of results**
- ❖ **Market observable prices volatile and unreliable if security is thinly traded**
- ❖ **Market value of assets may fluctuate significantly**
- ❖ **Additional capital may be required to withstand volatility**



Implications of GPV Method

- ❖ **Pricing process becomes more complicated**
 - **need to form a view of future market prices**
- ❖ **For example, to determine reserving requirements in 10 years time, an assumption of full term structure of government bond yields in 10 years time is needed**
- ❖ **Companies may increase the price to reflect this uncertainty i.e. to service the cost of holding additional capital**