Challenger Life Company Limited

Comparability of capital requirements across different regulatory regimes

26 August 2014

Building a better working world

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Challenger Life Company Limited
Level 15
255 Pitt Street
Sydney NSW 2000

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Comparability of capital requirements across different financial institutions

We are pleased to present our report covering the comparison of capital requirements between Australian life insurers and Australian banks for select fixed term investment products and also the comparison of life insurers' regulatory capital requirements under Australian and European standards for annuities.

The report has been prepared in accordance with your instructions, and covers the product types and supporting asset portfolios determined by you.

We draw your attention to the "Modelling limitations and other considerations" and "Reliances and limitations" sections of this report.

Please do not hesitate to contact us if you would like to discuss any matter contained in the report.

Yours sincerely

Ernst & Young

Ernst & Young

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Contents

Background

- The Australian government is currently conducting a review of the Australian financial system by way of the establishment of the Financial System Inquiry (FSI). The FSI has recently released an interim report and has called for further submissions. In particular, submissions are sought in relation to Australia's regulatory architecture and retirement incomes market.
- We have been engaged by Challenger Life Company Limited (Challenger) to prepare this report, which provides a comparison of the regulatory capital requirements (including provisioning strain):
  - across Australian banking and life insurance regulatory capital regimes for specific fixed term investment products (fixed term annuities and term deposits); and
  - between the Australian life insurance regulatory capital standards and the proposed European insurance regulatory capital standards (Solvency 2 – standard approach) for longer term fixed and lifetime annuities.
- Differences in the accounting treatment and regulatory capital regimes for banks and insurers reflect a range of historical developments and industry differences. Different accounting regimes between banks and life insurers mean that there are some difficulties in comparing the reported balance sheets between the two. Broadly, the life insurer's annuities liabilities and assets are 'mark-to-market' while banks account for the majority of their assets and liabilities on a 'book value' basis. Consequently, the results shown are illustrative rather than precise in nature.
- By necessity we have looked at illustrative regulatory capital requirements for individual portfolios. The overall capital requirement for an entity can be impacted by a diversification benefit from operating individual portfolios as part of a diverse book of business.
- The absolute level of capital required to be held by banks and insurers is ultimately a matter determined by the Boards of those entities, and is subject to supervision by prudential regulators. This results in target capital levels in excess of the minimum regulatory amounts which are the subject of the comparison contained in this document. As the basis for target capital is entity specific, we have limited this analysis to a comparison of the regulatory capital.
- The results of our analysis should be treated with care, as even though minimum bases are generally prescribed, the regulators retain the ability to add further entity specific capital requirements.
- Further, entities will be likely to aim to retain certain rating levels from credit agencies.

Executive summary (1)

Life insurance capital regimes vs. APRA bank capital regime

- Life insurers' regulatory capital requirements are higher than those of banks for longer term fixed interest rate products. For the reasons set out below, the modelled capital requirements are higher for life insurers under both asset scenarios considered for longer term fixed interest products (5 and 15 year terms) which provide essentially the same benefits and have the same economic substance.
- Life insurers incur a provisioning strain (and hence capital strain) which increases with the term of the products.
  A life insurer differs from a bank in that it is implicitly charged a provisioning strain for the difference between the investment yield offered to customers and the risk free rate used to value the liabilities. The provisioning strain also includes a strain for the present value of certain expenses. This forms part of the overall capital requirement. The strain increases with the term of the product and is sensitive to the excess of the investment return offered to consumers over the risk free rate.

  The results shown in this report have been determined on a pricing basis of 100bps over the swap rate for the annuity term. If this margin was lower, then the life insurer provisioning strain (and hence capital requirement) would reduce, perhaps materially.
- Life insurers' asset risk charges are sensitive to the duration of both assets and liabilities.
  An increase in the duration of assets and/or liabilities will lead to a larger asset risk charge for longer term life insurer business.

APRA life insurance capital regime vs. Solvency 2 capital regime

- The illiquidity premium difference between APRA life insurance (APRA LI) and Solvency 2 (S2) capital regimes has a major impact on which regime's capital requirement is higher.
  A higher illiquidity premium (or "matching adjustment" under S2) allowance in determining liabilities reduces the provisioning strain. The S2 matching adjustment (MA) can be larger than the APRA specified illiquidity premium, but there are greater restrictions on the application of the MA which mean that insurers may not be able to apply all (or any) of the MA in practice.

  We note that there are potential actions that an insurer can take to transform certain assets to qualify for the MA, thereby reducing the S2 capital requirement. A number of European annuity providers currently have or are actively investigating these arrangements, given that the matching adjustment would have a significant impact on their capital requirements.

Executive summary (2)

APRA life insurance capital regime vs. Solvency 2 capital regime (continued)

- S2 risk margin increases provisioning strain under S2.
  The S2 risk margin is a separate cost of capital provision for non-hedgeable risks (such as longevity and expense risk) under S2. It increases the total technical provisions and thus the provisioning strain compared to APRA LI (ignoring any illiquidity premium differences).
- Higher interest rate and credit spread stresses under S2 are partly responsible for a higher capital requirement compared to APRA LI for an asset portfolio weighted to growth assets.
- S2 specifies a Minimum Capital Requirement (MCR). The S2 Directive developed in Europe contains a principle that an insurer's authorisation will be withdrawn if the insurer fails to meet its MCR and is unable to restore capital above this level within a short period of time.

  The S2 MCR is calibrated to a 85% probability of sufficiency. This compares to a 99.5% probability of sufficiency for the S2 Solvency Capital Requirement (SCR) and APRA LI Prescribed Capital Amount.

  It is difficult to assess how the respective supervisors will implement their ladders of intervention as insurers approach or breach their SCRs or Prudential Capital Requirements.

Approach

- With the retirement income market in mind we have estimated and performed a comparison of regulatory capital outcomes (allowing for the provisioning framework) for 3, 5 and 15 year term certain annuity products (written through a life insurer and subject to APRA LI regulatory capital standards) against 3, 5 and 15 year term deposits (written through a bank and subject to APRA's bank regulatory capital standards).
- We have also performed a comparison of regulatory capital outcomes for 3, 5 and 15 year term certain annuity products and lifetime annuity products under APRA LI regulatory capital standards and proposed European capital standards (Solvency 2 - standard approach, as at July 2014).
- Our analysis was based on a simplified portfolio of the products and compares and contrasts regulatory capital requirements under the following asset portfolio scenarios, as specified by Challenger:
  - Illustrative bank asset mix, duration matched to liabilities (mostly residential mortgage loans and business loans)
  - 100% corporate bond portfolio with a credit rating of A and duration matched to liabilities
  - Life insurer asset mix weighted towards growth assets
- Our analysis has been performed using a pricing basis of 100bps over the swap rate for the annuity term as specified by Challenger.
- The life insurer asset mix weighted towards growth assets is not tested for 3 and 5 year term products, as it is assumed that this would not be a realistic representation of the asset mix backing products of this duration.
- A number of modelling simplifications have been made in estimating the capital requirements. The factors set out in the *Modelling limitations and other considerations* section should therefore be taken into account in interpreting the results presented in this report.

Summary of results (1)

Capital requirements have been taken as the regulatory capital requirement, plus the provisioning strain in the case of a life insurer. The provisioning strain arises from the difference between the annuity pricing rate and the valuation discount rate, as well as the inclusion of a reserve for certain expenses.

The following tables provide a summary of the capital requirements (as % of premium or deposit) for term products over select asset portfolio scenarios, considered under the regulatory regimes below:

- Current APRA LI capital standards
- Proposed Solvency 2 regulations (as at July 2014) – standard approach
- Current APRA bank capital standards, based on Basel III rules – standard and advanced (internal model) approaches

3 year term certain annuity (RCV100) – as % premium

	Scenario	APRA LI capital requirement	S2 LI capital requirement	APRA bank capital requirement – standard approach	APRA bank capital requirement – advanced approach
A	Bank asset mix (illustrative)	7%	8%	7%	4%
B	100% corporate bonds (A-rated, duration matched to that of liabilities)	7%	5%	6%	4%

5 year term certain annuity (RCV100) – as % premium

	Scenario	APRA LI capital requirement	S2 LI capital requirement	APRA bank capital requirement – standard approach	APRA bank capital requirement – advanced approach
A	Bank asset mix (illustrative)	10%	12%	7%	4%
B	100% corporate bonds (A-rated, duration matched to that of liabilities)	11%	9%	6%	4%

Summary of results (2)

15 year term certain annuity (RCV0) – as % premium					
	Scenario	APRA LI capital requirement	S2 LI capital requirement	APRA bank capital requirement – standard approach	APRA bank capital requirement – advanced approach
A	Bank asset mix (illustrative)	16%	18%	7%	4%
B	100% corporate bonds (A-rated, duration matched to that of liabilities)	16%	11%	6%	4%
C	LI asset mix weighted to growth assets	23%	27%	22%	21%

The following table provides a summary of the capital requirements (as % of premium) for a lifetime annuity over each asset portfolio scenario, considered under the regulatory regimes below:

- Current APRA LI capital standards
- Proposed Solvency 2 regulations (as at July 2014) – standard approach

Lifetime annuity (65 year old male, no indexation) – as % premium			
	Scenario	APRA LI capital requirement	S2 LI capital requirement
A	Bank asset mix (illustrative)	30%	38%
B	100% corporate bonds (A-rated, duration matched to that of liabilities)	30%	23%
C	LI asset mix weighted to growth assets	38%	44%

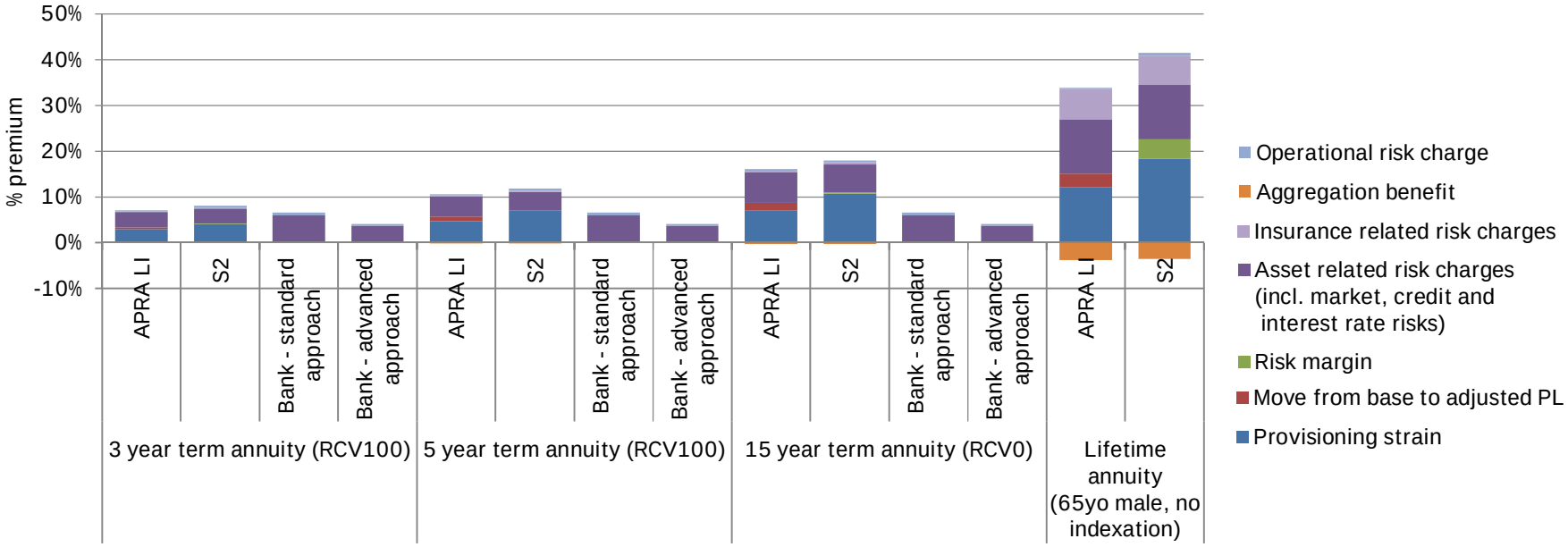
Scenario A – Bank asset mix, illustrative

Scenario A – Illustrative bank asset mix (assume duration matched to liabilities)

The chart shows the annuity capital requirement for a life insurer and the term deposit capital requirement for a bank under the different regulatory regimes, based on an illustrative bank asset mix weighted towards residential mortgage and corporate loans.

For S2 estimates, the matching premium is assumed to not be applicable.

Asset	Weighting
Bank deposit at call	5%
CGB bonds	3%
Corporate bonds	3%
RMBS	-
Equity	-
Property	-
Bank-owned loans	89%
► *Business lending*	*29%*
► *Mortgage loans, fixed rate*	*60%*



Scenario A – Bank asset mix, illustrative
Observations

- Asset mix. The illustrative bank asset mix consist largely of residential mortgage loans (60%) and various types of business lending (29%) as well as having small exposures to government and corporate securities. This has a lower risk profile than the illustrative portfolio held by a life insurer (scenario C) and this is reflected in the capital requirements shown.
- Life insurers incur a provisioning strain which increases for longer term business. A significant difference between life insurer and bank capital requirements is that life insurers are required to (a) discount their liabilities at risk-free rates, which is lower than the annuity yields illustratively offered, and (b) hold a reserve for future expenses. This results in a "provisioning strain" which does not apply to banks. As the duration of liabilities increases, the provisioning strain increases and becomes more sensitive to interest rate movements.
- Matching adjustment is a key driver of S2 capital requirements. Under scenario A the matching adjustment - effectively an illiquidity premium - is assumed to not apply. This is the main reason why S2 policy liabilities (and hence provisioning strain) and overall capital requirement are larger than that for APRA LI, particularly for the longer term lifetime annuities (S2 capital requirements are 38% of premium vs. 30% for APRA LI).

  We note that there are potential actions that an insurer can take to transform certain assets to qualify for the MA thereby reducing the S2 capital requirement. A number of European annuity providers currently have or are actively investigating these arrangements, given that the matching adjustment would have a significant impact on their capital requirements. *Refer to appendix C for details on the matching adjustment.*
- Asset risk charge:
  - The asset risk charge for life insurers is similar to that of banks for comparable, short to medium term business (3 and 5 year annuities and term deposits).
  - Life insurer asset risk charges are considerably higher for longer term business (15 year term and lifetime annuities) than for short term business. This is because the duration of assets and liabilities is taken into account by life insurers when calculating stress impacts on the market value of assets and best estimate value of liabilities. In particular, a higher duration leads to a larger credit spread stress on credit risky assets such as loans. *(Continued next page)*

Scenario A – Bank asset mix, illustrative
Observations (continued)

- Asset risk charge (continued):
  - The advanced approach bank capital requirement is lower than that under the standardised bank capital approach, due to lower risk weights being applied under the advanced approach for the assets considered here (mostly residential mortgage and business lending).
- Risk margin. The risk margin is a reserve for "non-hedgeable" risks (such as longevity and expense risks) which is held in addition to policy liabilities under the S2 regime. For lifetime annuities, this contributes to S2's overall capital requirement being higher than that for APRA LI.
- Operational risk charge: The operational risk capital charge is somewhat higher for the banks relative to life insurers (although this is still a small part of the overall capital requirement, c. 0.5% premium). We note that for standardised banks, the operational risk capital charge is related to the business mix and hence varies in accordance with the portfolio composition while for the life insurers the operational risk charge is related to the value of liabilities and changes in volume of liabilities and payments.
- Insurance risk charge: The life insurance risk charge is similar under APRA LI and S2 as the same longevity and expense stresses are applied (although the S2 life risk charge also includes a small expense inflation component).

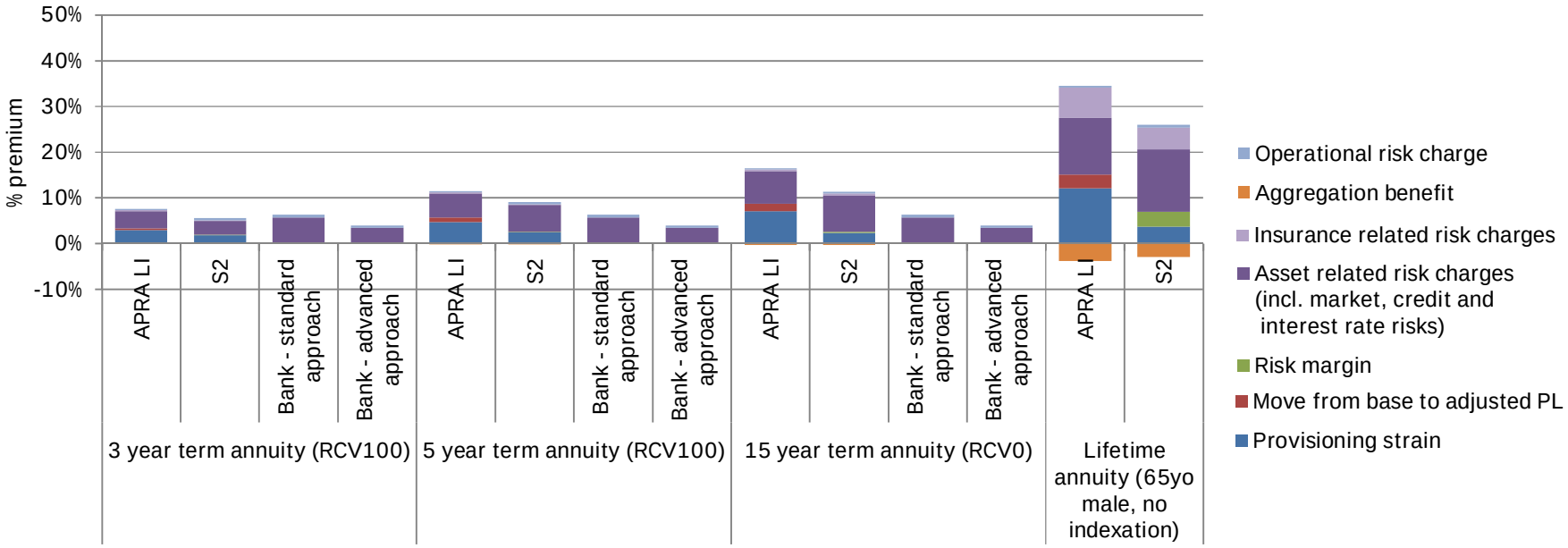
Scenario B – 100% corporate bonds

Scenario B – 100% corporate bonds (average credit rating A, duration matched to that of liabilities)

The chart shows the annuity capital requirement for a life insurer and the term deposit capital requirement for a bank under the different regulatory regimes, based on a 100% corporate bonds asset mix with an average A credit rating and duration equivalent to that of liabilities.

For S2 estimates, the matching premium is assumed to be applicable to all of the liability portfolio.

Asset	Weighting
Bank deposit at call	-
CGB bonds	-
Corporate bonds	100%
RMBS	-
Equity	-
Property	-
Bank-owned loans	-



Scenario B – 100% corporate bonds
Observations

- Asset mix: This asset mix is solely made up of A-rated corporate bonds which are considered to offer a reasonable match to liability cashflows and duration. As such, this is the lowest risk scenario and this is reflected in the capital requirements. We have not adjusted the bank asset mix to attempt to allow for liquidity requirements.
- Impact of matching adjustment. The S2 matching adjustment is assumed to fully apply in this scenario. Our assumed matching adjustments range from 80bps (for durations of 3 years) to 125bps (for durations 10 years and over) and are often larger than those under APRA LI.

  For this scenario, this results in S2 provisioning strains which are smaller than those for APRA LI (particularly for long term lifetime annuities). The matching adjustment reduces the "gap" between annuity rates and valuation discount rates.
- S2 asset risk charges which are close to those for APRA LI.
  The increased asset-liability matching under this scenario mutes the impact of higher interest rate and credit spread stresses under S2.
- As with scenario A:
  - Life insurer provisioning strains and asset risk charges increase with duration.
    This is particularly evident in the lifetime annuity results.
  - Bank capital requirements are lower under the advanced approach than under the standard approach
- *See scenario A for observations on provisioning strain, risk margin, insurance and operational risk charges.*

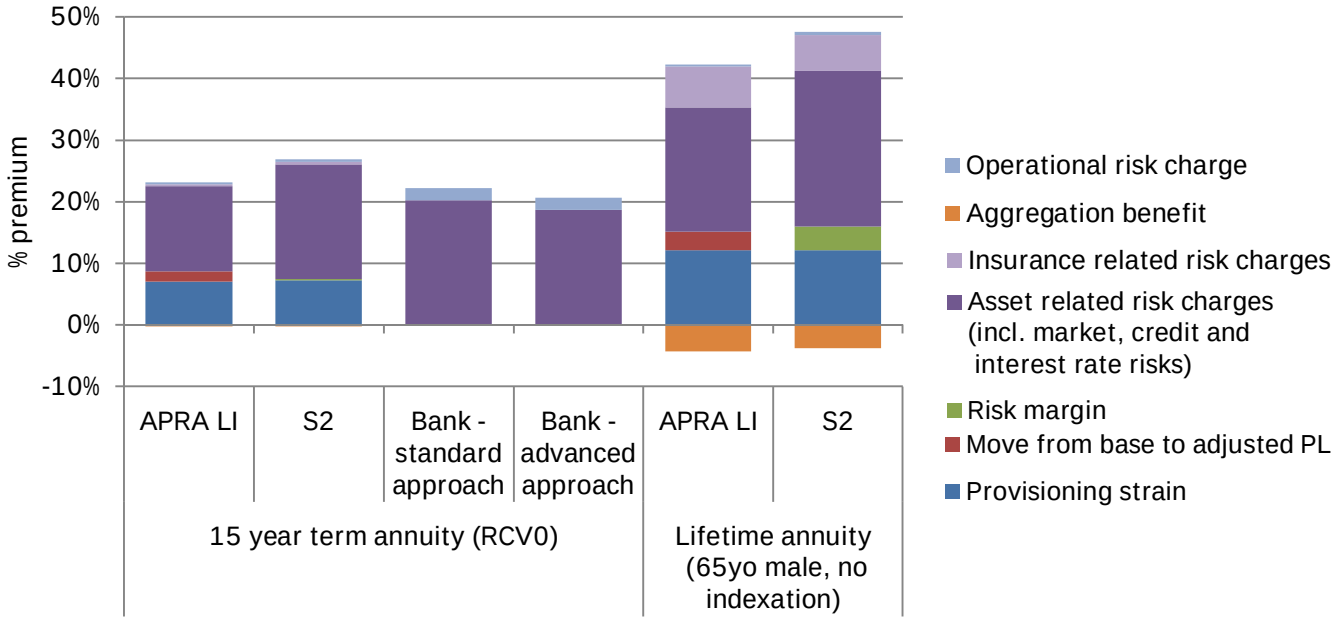
Scenario C – Life insurer growth asset mix

Scenario C - Life insurer weighted to growth asset mix (fixed interest assets duration matched to liability cash flows)

The chart shows the annuity capital requirement for a life insurer and the term deposit capital requirement for a bank under the different regulatory regimes, based on an illustrative life insurer asset mix with a weighting to growth assets. (We note that this asset mix is not typical for banks, whose assets are usually dominated by retail and commercial lending and have little to no equity or property exposure.)

The overall asset duration will not be the same as the liability duration as the matching fixed interest assets do not make up the whole of the asset portfolio. It may be difficult to match the duration of longer term liabilities in practice, particularly for lifetime annuities which can have expected durations of 15 years or more.

For S2 estimates, the matching adjustment is assumed to apply to 40% of the liabilities portfolio (assuming that only corporate bond assets qualify as matching assets).



Asset	Weighting
Bank deposit at call	5%
CGB bonds	5%
Corporate bonds	40%
RMBS	20%
Equity	10%
Property	20%

Scenario C – Life insurer growth asset mix
Observations

- Asset mix: This asset mix is weighted towards growth assets, such as equity and property and also includes high yield assets such as residential mortgage-backed securities (RMBS). The asset mix is designed to provide a higher expected yield to support longer term, relatively illiquid business. This is a higher risk asset profile than the other scenarios and, as such, has a higher capital requirement under both bank, APRA LI and S2 regimes.
- Impact of matching adjustment. A partial matching adjustment applies under this scenario. This has resulted in APRA LI and S2 provisioning strains which are similar in size, in contrast to scenarios A and B.

  We note that the S2 matching adjustment (MA) - effectively an illiquidity premium - can be larger than the APRA specified illiquidity premium, but that there are also greater restrictions on the application of the matching adjustment.
  - If the MA is not applicable, S2 policy liabilities (and hence provisioning strain) are likely to be larger than for APRA LI.
  - If the MA is applicable, S2 provisioning strain can be lower than under APRA LI (although the S2 risk margin can partially or completely offset the difference).

  We also note that there are potential actions that an insurer can take to transform certain assets to qualify for the MA, thereby reducing the S2 capital requirement. A number of European annuity providers currently have or are actively investigating these arrangements, given that the matching adjustment would have a significant impact on their capital requirements. *Refer to appendix C for details on the matching adjustment.*
- As with scenario A, life insurers have similar or higher capital requirements than banks for comparable business (15 year annuities and term deposits) as they incur a provisioning strain for new business.
- S2 asset risk charge is considerably higher than that under APRA LI – the S2 asset risk charge is higher than APRA LI by around 5% of premium. The main drivers of this are the higher interest rate and credit spread stresses under S2. This is particularly the case for the RMBS asset holdings, which receive a spread stress under S2 which is more than twice that under APRA LI.

  We note that the S2 treatment of securitised assets is still being discussed by European regulators and market participants and has changed substantially over the last few years.
- *See scenario A for observations on provisioning strain, risk margin, insurance and operational risk charges.*

Modelling limitations and other considerations

Target capital / surplus

- The capital requirements presented in this analysis are based on regulatory minima. In practice, institutions hold excess capital over this regulatory capital to act as a buffer to avoid breaching regulatory capital requirements.
- The additional capital buffer forms an integral part of an institution's overall capital requirements and should ideally be considered when comparing capital requirements. As the capital buffer will be entity specific, we have limited our report to the regulatory requirement (i.e. not allowed for capital buffers).

Others

- No allowance has been made for management actions within the life insurer capital calculations but the expected impact is limited for this class of business.
- No allowance for diversification between products and funds has been made. Under S2, diversification benefits can generally be recognised subject to appropriate fungibility. However, in practice there may be barriers to achieving this while still recognising the matching adjustment, so diversification benefits may be limited.
- No life insurer supervisory capital adjustments have been allowed for. For the banks we have assumed a PCR of 11.5% for both standard and advanced banks.
- No explicit testing of the eligibility of assets for the S2 matching adjustment has been performed.
- We have not considered the split of capital into Tier 1 and Tier 2 components.
- No allowance has been made for asset concentration risk charges that may apply under APRA LI and S2.
- Liquidity coverage ratio requirements for banks under Basel III have not been considered.

Reliances and limitations

This report has been prepared for use by Challenger Life Company Ltd (Challenger) for the purpose of better understanding the differences between the regulatory capital requirements of Australian insurers compared to Australian banks for select fixed term investment products and also to compare life insurers' regulatory capital requirements under Australian and European standards for annuities.

We disclaim any responsibility for the use of our report for a different purpose or in a different context.

Challenger has the ultimate responsibility for all decisions relating to this report. We disclaim all liability to any other party for all costs, loss, damage and liability that the other party may suffer or incur arising from or relating to or in any way connected with the contents of this report, the provision of the report to the other party or the reliance upon this report by the other party without our prior written consent.

The information contained in this report is based on estimates of the capital requirements for a life insurer and a bank based on our understanding of the current regulatory capital standards for Australian life insurers and banks and the proposed regulatory capital standards for European life insurers under Solvency 2. The results are estimates only and are based on the example asset and liability portfolios set out in the Background and Appendix sections of this report. Care should be taken in interpreting the results as the example portfolios and scenarios contained therein are not intended to be reflective of any particular individual company or portfolio.

This report is based on our understanding of relevant legislation and regulatory requirements (particularly capital standards) in force at the date of the report and does not anticipate any future changes in legislation or regulatory requirements.

The work that we have performed does not constitute an audit in accordance with Australian Auditing Standards or a review made in accordance with Australian Auditing Standards applicable to review engagements and, consequently, no assurance is expressed. Our work does not constitute legal advice.

In preparing this report we have assumed that only those persons who are technically competent in the areas addressed will use it. The report is to be considered as a whole and has been designed to be read in its entirety. The reader should seek advice before drawing conclusions on any matter in question.

Appendix A
Detailed comparison of standards

Component	APRA LI regulatory capital	Solvency II (proposed)	Bank capital regime
Regulatory minimum capital	Single tier capital requirement: ► Prudential Capital Requirement (PCR) which is the regulatory minimum – insurers must hold a capital base in excess of the PCR at all times.	Two tier regulatory capital requirement: ► Solvency Capital Requirement (SCR), which is the capital level below which supervisory intervention commences. ► Minimum Capital Requirement (MCR), which is regulatory minimum. Set at between 25% and 45% of the SCR. An escalating ladder of supervisory intervention applies once an insurer breaches its SCR. A breach of the MCR would result in the implementation of a strict recovery plan and (if this plan is not complied with) implementation of a resolution plan, including closure of the insurer's business.	APRA regulated banks are subject to a Prudential Capital Requirement (PCR) as determined by APRA. ► The minimum PCR specified in the standards is equal to 8% of risk weighted assets. ► APRA specifies regulatory adjustments to the PCR for each bank which increase the minimum that needs to be held. Under Basel III these are set to at least 2.5% of risk weighted assets, plus 1% of risk weighted assets for domestically systemically important banks.
Capital sufficiency	99.5% over a one year time horizon (i.e. 1 in 200 year event)	SCR: 99.5% over a one year time horizon MCR: 85% over a one year time horizon (i.e. 1 in 7 year event)	Approximately 99.9%+ overall (varies by risk type) (i.e. 1 in 1000 year event) No explicitly defined level of sufficiency.
Capital components	► Asset risk charge, plus default stress ► Asset concentration risk charge ► Insurance risk charge ► Operational risk charge ► Combined stress scenario adjustment ► Supervisory adjustments	► Market risk component, incl. concentration risk ► Default risk component ► Life risk component ► Operational risk component ► Adjustments	► Credit risk component ► Operational risk component ► Market risk component ► Interest rate risk in the Banking Book (IRRBB) –advanced banks only ► Regulatory adjustments
Capital calculation approach	Insurers are able to calculate their PCR using the standard prescribed approach or an internal model. All participants are currently using the standard approach.	► Insurers are able to calculate their SCR using a standard approach or internal model. Most insurers are using a combination of the two. ► S2 regulations are much more detailed and complex, reflecting the complex nature of the European insurance sector.	Banks are able to calculate their capital requirement using a standard or internal model based approach. The large banks use internal models while regional banks are more likely to adopt a standard approach.
Illiquidity premium	Specified by APRA.	Known as "matching adjustment". There are greater restrictions on the calculation and use of these premiums (see Appendix C for details).	N/A – Banks have separate liquidity requirements which we have not considered here.
Target capital	Insurers need to maintain a buffer above the PCR.	Insurers need to maintain a buffer above the SCR.	Banks need to maintain a buffer above the PCR.

Appendix A
Detailed comparison of standards

The following section sets out a comparison of the explicit capital components considered in the analysis.

Component	APRA LI regulatory capital vs. Solvency II (proposed)	Bank capital regime
Market and credit risk: ► Asset risk charge (APRA LI) ► Market risk charge (S2) ► Market, asset and IRRBB charges (bank)	APRA LI and S2 cover similar market and credit risk stress components (e.g. interest rate, equity, property, spread risks, default risk, currency). However the parameters and methods prescribed are different for a number of stress components. The shocks are applied to both the assets and (where appropriate) the liabilities. Stresses are driven by the nature of the assets and liabilities. Key observations from the scenarios tested indicate that: ► Size and application of interest rate stresses differs between APRA LI and S2, resulting in a stress that is higher for an LI asset mix under S2. ► Size and application of spread risk stresses is different, with stresses varying by duration as well as by credit rating. Significantly higher spread stress charges are applied to securitised assets under S2. Under the latest charges proposed in July 2014, the stress for an A-rated, 7 year securitised asset is equal to 28% market value (vs. 11% under APRA LI standards). ► There is no explicit inflation stress under S2 standard approach apart from an expense inflation stress allowed for under the life risk component (inflation is stressed under an internal model approach). Explicit inflation stress applies for APRA LI. ► Equity stress is higher under S2 compared to APRA LI. ► Property stress is lower under S2 compared to APRA LI.	Under the bank capital regime market and credit risks are only applied to assets. Stresses are grouped into the following components: ► Market risk charge - addresses changes in the value of securities held in the trading book ► Asset risk charge - considers credit risks in the asset portfolio. It is based on set regulatory factors (standardised) or internal models (advanced). ► IRRBB charge (advanced banks only) - addresses a loss of earnings or economic value of the banking book as a result of changing interest rates.
Insurance risk: ► Insurance risk charge (APRA LI) ► Life risk charge (S2)	APRA LI and S2 cover similar insurance risk stress components. For annuities the same risk types are covered: term certain annuities include an expense stress and lifetime annuities also allow for a longevity stress. From our scenarios, we observed some relatively minor differences: ► A 25% factor for correlation between longevity and expense stress is allowed for in S2's life risk charge, but not under APRA LI regulations. ► Expense inflation is included in the asset risk charge for APRA LI and in the life risk charge for S2 insurers.	

Appendix A
Detailed comparison of standards

Component	APRA LI regulatory capital	Solvency II (proposed)	Bank capital regime
Operational risk	An explicit operational risk charge is calculated with reference to policy liabilities, premium and claims cashflows over the year.	An explicit operational risk charge is calculated with reference to technical provisions (best estimate liabilities plus risk margin) and the basic SCR.	An explicit operational risk charge is calculated based on regulatory factors such as revenue (Standardised) or internal modelling (Advanced).
Default risk	An explicit default risk component is calculated for each asset subject to counterparty default risk. The charge is calculated as a proportion of the market value where the prescribed stress varies by credit rating.	► For type 1 exposures (e.g. reinsurance) this is calculated as a multiple of the standard deviation of the loss distribution ► For type 2 exposures (e.g. mortgage loans) this is calculated as a proportion of the loss-given-default. A correlation factor between type 1 and 2 default charges is also allowed for.	Considered in the credit risk charge (above)
Aggregation benefit	Calculation approach is the same for APRA LI and S2. S2 allows for 25% correlation between market and life risk charges, which is slightly higher than APRA LI's 20% correlation factor between asset and insurance risk charges.		

In addition to regulatory capital requirements, S2 also requires that insurers hold a risk margin above their best estimate liabilities as part of their technical provisions. APRA LI and banks do not have this requirement.

Component	APRA LI regulatory capital	Solvency II (proposed)	Bank capital regime
Risk margin	N/A	In addition to best estimate liabilities, insurers are required to hold a risk margin for "non-hedgeable risks" such as insurance and operational risks. This is calculated using a "cost of capital" approach.	N/A

Appendix A
Detailed comparison of standards

The accounting standards for life insurers result in some additional implicit charges on the capital of life insurers. We have included these in the analysis and they are explained below.

Component	APRA LI regulatory capital	Solvency II (proposed)	Bank capital regime
Provisioning strain - annuity to policy valuation rate	▸ Valuation liabilities are estimated based on a discounted rate using a risk-free rate derived from the CGB yield curve, plus an illiquidity premium determined by the Appointed Actuary (c. 50bps at June 2014 using the swap-based formula proposed by the Actuaries Institute). ▸ Provisioning strain arises when the risk-free rate plus illiquidity premium is lower than the annuity rate offered to customers.	▸ Liabilities are valued at a risk-free rate plus a matching adjustment (illiquidity premium) if the required asset qualifying criteria are satisfied. ▸ Provisioning strain arises when the risk-free rate plus illiquidity premium is lower than the annuity rate offered to customers.	N/A
Provisioning strain – expense reserve	A reserve for future expected expenses is included in the projected cash flows used to determine the life insurance policy liability and this represents an implicit capital charge.	Similar expense reserve to APRA LI but valuation discount rate is different	N/A
Change in regulatory capital illiquidity premium allowance	Under APRA LI the illiquidity premium allowance is formula driven based on published bond spreads. In most scenarios the illiquidity premium will be lower under the capital standard compared to the accounting treatment which leads to an increase in liabilities and implicit capital	N/A. Matching adjustment considered under annuity to policy valuation rate.	N/A

Appendix B
Modelling approach

We have estimated capital requirements under different scenarios for an example portfolio of term certain and lifetime annuity products written through a life insurance company and a portfolio of term deposits written through a bank.

Assets

- Assets been modelled using a model point for each asset type (equity, corporate bonds etc.) with the duration and credit rating set equal to the assumed average duration and credit rating for the asset type portfolio.
- Interest bearing assets have been valued at point of sale (i.e. yield to maturity set equal to the coupon rate).
- Duration assumptions are shown in the "Modelling approach – asset treatment" section.

Liabilities

- Liabilities have been valued at point of sale.
  - For example, if the initial deposit / premium is $150k then we assume that the bank establishes a liability of $150k while the life insurers establish a liability of $150k plus provisioning strain.
  - The 'capital' is then the amount held over and above $150k.

  For the life insurer, this includes both 'capital' held implicitly in the policy liability and explicitly as part of regulatory capital.

Products modelled

- We modelled the following products:
  - 3 and 5 year term certain annuities (residual capital value (RCV100) - premium returned at end of term)
  - 3 and 5 year term deposits
  - 15 year term certain annuity (RCV0)
  - Lifetime annuity with no benefit indexation, 65 year old male annuitant
- All products are priced at a yield of 100bps over 30 June 2014 Australian swap rates with an allowance for ongoing expenses. We have not considered commissions or tax in our modelling.
- Economic assumptions (e.g. interest rates) are based on Australian market observable rates as at 30 June 2014.
- For term annuities, no surrenders were assumed.
- For lifetime annuities, longevity assumptions are based on UK annuitant mortality tables.

Appendix B
Modelling approach – Asset portfolios

For our illustrative asset portfolios, the following asset mixes were assumed:

Asset type	A Bank asset mix (illustrative)	B 100% corporate bonds (A rated)	C Life insurer asset mix weighted to growth assets (illustrative)
Bank deposit	5%	-	5%
Commonwealth Gov't securities	3%	-	5%
Corporate bonds (A-rated)	3%	100%	40%
RMBS (residential mortgage backed securities) (A-rated)	-	-	20%
Equity	-	-	10%
Property	-	-	20%
Bank-owned loans	89%	-	-
Consisting of:			
► *Business lending*	*29%*		
► *Residential mortgages, fixed rate (loan to value ratio of 80% assumed)*	*60%*		

- All assets are assumed to be Australian (i.e. no currency exposure).
- Derivatives and reinsurance have not been included in our asset portfolios, for ease of comparability. However we note that life insurers and banks may hold these in practice and that there are differences in their treatment under APRA LI, S2 and bank capital standards. Where these assets are held to reduce risk exposure, the impact on overall capital requirements may also vary under each capital regime.
- Assets not eligible to be included in an APRA LI capital base (e.g. intangibles) have also been excluded from our asset portfolios.

Appendix B
Modelling approach – Asset treatment

The calculation treatment of each asset type by life insurers is shown below.

Banks apply credit, interest rate and operational risk charges to all assets – see "Modelling approach – Banking capital" section for details.

Asset type	Stresses applied under APRA LI	Stresses applied under S2	Weighted duration	Average credit rating
Bank Deposit at call	► Credit spread stress	► N/A – treated as cash	N/A	A1+
CGB bonds	► Real interest rate stress ► Inflation stress ► Credit spread stress	► Interest rate risk ► Spread risk	3 year and 5 year term certain annuities (RCV100) – same as annuity nominal duration 15 year term certain annuity (RCV0) – 7 years Lifetime annuity - 11 years	Government
Corporate bonds	Same treatment as above	Same treatment as above	Same treatment as above	A
RMBS (residential mortgage backed securities)	Same treatment as above.	Same treatment as above. We note that the securitised bond specific spread risk factors have been applied.	7 years	A
Equity (listed)	► Equity stress	► Equity risk	N/A	N/A
Property	► Property stress	► Property risk	N/A	N/A
Bank-owned loans: ► *Residential mortgage loans* ► *Business lending*	► Real interest rate stress ► Inflation stress ► Credit spread stress	► Interest rate risk ► Spread risk (business lending only) ► Counterparty default risk – type 2 exposures (mortgage loans only)	3 year and 5 year term certain annuities (RCV100) – same as annuity nominal duration 15 year term certain annuity (RCV0) – 7 years Lifetime annuity - 11 years	A

Appendix B
Modelling approach – APRA LI

Capital requirement components have been calculated as follows:

Capital component	Approach
Policy liabilities and provisioning strain	Policy liabilities are calculated as the best estimate liability (BEL) determined at the risk-free rate. The risk-free rate is adjusted for a illiquidity premium which we have based on observable market spreads over government bond rates. The provisioning strain is calculated as the difference between the policy liability (reserve that the insurer needs to hold) and the premium.
Move from base to adjusted policy liabilities	Base policy liabilities are the liabilities calculated above. Adjusted policy liabilities are calculated as per the base policy liabilities, except that the illiquidity premium is calculated using the APRA LI prescribed formula.
Asset risk charge / market risk charge	
► *Interest rate stress*	Impact of upwards / downwards interest rate stresses calculated as: ► the movement in asset market values following an up / down stress to asset yields, plus ► the movement in liabilities following an up / down stress to the risk free rate The up / down stress is calculated as: Nominal risk-free rate (t) * 0.25 (Up) or Nominal risk-free rate (t) * -0.20 (Down) where t is the duration of the asset or liability cashflow being stressed.
► *Inflation rate stress*	Impact of upwards / downwards inflation stresses calculated as: ► the movement in asset market values following an up / down stress to asset yields, plus ► the movement in liabilities following an up / down stress to the risk free rate The up / down stress is calculated as: 125Bps (Up) or -100Bps (Down) The stress is added to the nominal risk-free rate.
► *Credit spread stress*	Impact of spread stresses calculated as: ► the movement in asset market values following a spread stress to asset yields. The market value of the asset post-stress is then adjusted by a default factor. The spread stress is dependent on the asset type and associated counterparty grade. The default factor is dependent on the associated counterparty grade of the asset.

Appendix B
Modelling approach – APRA LI

Capital component	Approach
Asset risk charge / market risk charge (continued)	
► *Equity stress*	Calculated as the movement in equity market value that would result from an increase in the dividend yield by 2.5%, as specified in the standards.
► *Property stress*	Calculated as the movement in property market value that would result from an increase in the assumed rental yield of 2.75%, as specified in the standards.
► *Diversification benefit*	Calculated as the sum of individual asset stresses above with allowance for diversification between the stresses as per the specified correlation matrix.
Insurance risk charge / life risk charge	
► *Longevity stress*	Impact on the BEL of a 20% decrease in the best estimate mortality rate for each age.
► *Expense stress*	Impact on the BEL of a 10% increase to the best estimate future unit costs of servicing expenses.
► *Diversification benefit*	Calculated as the sum of individual insurance (excluding expense stress) stresses above with allowance for diversification between the stresses as per the specified correlation matrix.
Other PCR components	
Aggregation benefit	Calculated as the sum of asset and insurance risk charges with allowance for diversification between the two risk modules as per the specified correlation matrix; i.e.: $\text{Aggregation benefit} = ARC + IRC - \sqrt{(ARC^2 + IRC^2 + 2 * 20\% * ARC * IRC)}$ where ARC = asset risk charge, IRC = insurance risk charge
Default stress	Not applicable for the chosen assets – all assets with a default risk exposure (interest bearing assets, loans etc.) receive the spread risk stress.
Operational risk charge (ORC)	Estimated as 0.25% of adjusted policy liabilities, with reference to the specified formula for "other business" ORC.
Asset concentration risk charge	Not applicable - we have assumed that all assets are below concentration limits.
Combined stress scenario adjustment (CSSA)	Not applicable – we have assumed that the CSSA will not be material under gross of tax modelling.
Supervisory adjustments	Not applicable – we have assumed that no supervisory adjustments are required for the calculation of the PCR. In other words, the PCR is equal to the Prudential Capital Amount (PCA) which is calculated as the sum of the above components – asset, insurance, operational and asset concentration risk charges (including default stress) plus the aggregation benefit and the CSSA.

Appendix B
Modelling approach – Solvency 2 (standard approach)

Capital requirement components have been calculated as follows:

Capital component	Approach
Technical provisions	
Policy liabilities and provisioning strain	Best estimate liabilities have been calculated by projecting best estimate annuity cashflows and then discounting at risk-free rates, plus a matching adjustment (illiquidity premium) if the required asset qualifying criteria are satisfied. Provisioning strain has been calculated as the difference between the BEL post-purchase and the annuity premium. For comparability purposes we have used Commonwealth Government bond rates as the risk free rates.
Risk margin	Covers non-hedgeable risks. For our scenarios, we have assumed that the SCR longevity and expense stresses are non-hedgeable. (See the "life risk charge" description for more details on these stresses). We have estimated the risk margin using a cost of capital approach; i.e. we: ► Projected the SCR for each future year, assuming that only non-hedgeable risks (longevity, expense stresses) apply ► Calculated the cost of capital for each future year; i.e. SCR * cost of capital ► Calculated the risk margin as the sum of the capital costs discounted at the risk free rate. We have assumed a cost of capital of 6% p.a..
Market risk charge	
► *Interest rate stress*	Impact of upwards / downwards interest rate stresses calculated as: ► the movement in asset market values following an up / down stress to asset yields, plus ► the movement in liabilities following an up / down stress to the risk free rate The up / down stress is calculated as: risk-free rate (t) * s^{up} (t) or risk-free rate (t) * s^{down} (t) where t is the duration of the asset or liability cashflow being stressed and s^{up} (t), s^{down} (t) are the specified stresses for the given duration.
► *Inflation rate stress*	Not included in the standard approach, although expense inflation is included within the life risk charge. We note that inflation stress would be included in an internal model with allowance for the interaction with interest rate stress.
► *Equity stress*	Calculated as equity market value * 39% as specified. We have assumed that all equity assets are listed and type 1.
► *Property stress*	Calculated as property market value * 25% as specified.
► *Currency stress*	Not applicable – no overseas assets included in asset scenarios. We note that the currency stress (a +/- 25% to the currency exchange stress) is the same as that for APRA LI.

Appendix B
Modelling approach – Solvency 2 (standard approach)

Capital component	Approach
Market risk charge (continued)	
▸ *Spreads stress*	Calculated as the interest bearing asset market value * spread risk factor. ▸ For AAA / AA rated government bonds the spread risk factor is zero. ▸ For corporate bonds we have used the specified spread risk factors which correspond to the asset's modified duration and credit rating. E.g. an A-rated, 3 year corporate bond has a spread risk factor of 4.2% (1.4% * 3). ▸ For RMBS (securitised assets) we have used the specified spread risk factor corresponding to the asset credit rating. E.g. an A-rated RMBS with a 7 year modified duration has a spread risk factor of 28% (4% * 7).
▸ *Diversified asset / market risk charge*	Calculated as the sum of individual stresses with allowance for diversification between the stresses as per the specified correlation matrix.
Life risk charge	
▸ *Longevity stress*	Calculated as the movement in liabilities following a 20% decrease in mortality rates (as specified).
▸ *Expense stress*	Calculated as the movement in liabilities following a 10% increase in expenses and 100bps increase to the expense inflation rate (as specified).
▸ *Diversified insurance / life risk charge*	Calculated as the sum of longevity and expense stresses with allowance for diversification between the stresses (25% correlation factor), as per the specified correlation matrix.
Other SCR components	
Aggregation benefit	Calculated as the sum of market and life risk charges with allowance for diversification between the two risk modules as per the specified correlation matrix; i.e.: $\text{Aggregation benefit} = MR + LR - \sqrt{(MR^2 + LR^2 + 2 * 25\% * MR * LR)}$ where MR = market risk charge, LR = life risk charge
Counterparty default stress (mortgage loans)	Calculated as 15% * expected loss-given-default (LGD), where the expected LGD is calculated as: loan value – 80% * stressed mortgage value The stressed mortgage value is determined by applying the market risk property stress (25%) to the base mortgage value.
Operational risk charge	Calculated as the minimum of 30% of the basic SCR and 0.45% of the technical provisions (the minimum for all scenarios), as specified.
Asset concentration risk charge	Not applicable - we have assumed that all assets are below concentration limits. We note that S2 asset concentration limits for each asset type vary by both credit rating and duration.
Adjustments	Not applicable – we have assumed that no further adjustments are required to the SCR.

Appendix B
Modelling approach – Banking capital

Capital requirement components have been calculated as follows:

Risk type	Standard ADI – Method	Advanced model – Method
Prudential Capital Ratio (PCR)	A Bank is subject to a prudential capital ratio ('PCR') as determined by APRA. The minimum PCR specified in the standards is equal to 8% of risk weighted assets, although APRA specifies regulatory adjustments for each bank which increase the actual PCR held. APRA specifies regulatory adjustments to the PCR for each bank which increase the minimum that needs to be held. Under Basel III these are set to at least 2.5% of risk weighted assets, plus 1% of risk weighted assets for domestically systemically important banks. Based on this, for simplicity we have set the PCR at 11.5% for banks following both the standard and advanced approach. We note that PCRs vary amongst banks in practice and may be higher or lower than this assumption.	
Credit risk charge	Calculated for each asset type as: *Asset value * risk weight * PCR* Risk weight assumptions are shown on the next page. The total credit risk charge is calculated as the sum of the credit risk charges for each asset type.	
Operational risk charge	Calculated as 10% of the credit risk charge as prescribed by the standard formula.	Estimated as 11% of the credit risk charge.
Market risk charge	It is assumed that no market risk charge is held.	It is assumed that no market risk charge is held.
Interest Rate Risk in Banking Book (IRRBB) charge	n/a – only applicable to advanced banks	Addresses a loss of earnings or economic value in the banking book as a result of changing interest rates. The IRRBB for 3, 5 and 15 year term deposits was estimated as 2% of the credit risk charge based on market observed IRRBB risk weighted assets as proportion of total risk weighted assets.
Total capital requirement	Calculated as: *Credit risk charge + operational risk charge + market risk charge + IRRBB charge*	

- Term deposit liabilities are held at book (face) value with no provisioning strain assumed.
- Assets are also held at book value.
- Operational risk and IRRBB capital requirements (as a percentage of the credit risk capital requirement) have been estimated with reference to recent Pillar 3 disclosure reports from large Australian banks.
- Figures represented are capital requirements only – no deductions or provisions are included.

Appendix B
Modelling approach – Banking capital

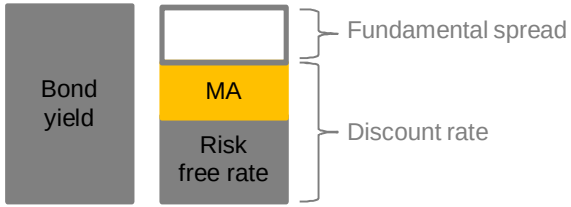
The risk weights used to calculate the credit risk charge are as follows:

Asset type	Standard approach	Advanced approach
Bank deposit	20%	15%
Commonwealth Gov't securities	0%	0%
Corporate bonds (A-rated)	50%	30%
RMBS (residential mortgage backed securities) (A-rated)	50%	8%
Equity	1250%	1250%
Property	100%	100%
Bank-owned loans		
► *Business lending*	*100%*	*62%*
► *Residential mortgages, fixed rate*	*35%*	*20%*

- Standardised bank risk weights are taken from APRA regulatory capital standards for banks.
- Advanced bank risk weights have been estimated with reference to recent Pillar 3 disclosure reports from large Australian banks (31 March and 30 June 2014).

Appendix C
Solvency 2 matching adjustment – definition

- Under Solvency 2 the matching adjustment allows an insurer to value liabilities at a discount rate higher than the risk free discount rate.
- The additional investment margin is similar to the illiquidity premium allowance under the Australian Prudential Standards.
- Article 77c (1) in the latest Presidency Comprise Text sets out the MA and can be interpreted as the difference between:
  - Market Gross Redemption Yield – Fundamental Spread
  - Risk free rate
- This is alternatively represented as: “market spread or risk premium” – “Fundamental Spread”.



Appendix C
Solvency 2 matching adjustment – required assets criteria

A matching adjustment shall be applied to calculate the best estimate of obligations under the following conditions (Article 77b in the compromise text):

- The portfolio of assets shall be assigned to the portfolio of obligations for the duration of the obligations.
- The asset portfolios shall be identified, organised and managed separately from other activities of the undertakings, and the assigned portfolio of assets cannot be used to cover losses arising from other activities of the undertakings.
- Assets must match the currency to the liabilities they back.
- The cash-flows of a portfolio of obligations are similar to those of an assigned portfolio of assets consisting of bonds and assets with similar cash-flows.
- The cash-flows of assets are fixed, except when the obligations are linked to inflation where assets replicating the exposure of the obligations to inflation can be used.
- The cash-flows of assets cannot be changed by the issuer or third parties.
- Only underwriting risks are longevity risk, life-expense risk, revision risk and mortality risk
- The underlying of the insurance obligations do not give rise to future premium payments.
- The underlying of the obligations do not include options for the policy holder, except from surrender options when the surrender value does not exceed that of the assets at the time the option is exercised.
- Underlying obligations cannot be split into different parts for the purposes of applying the matching adjustment.
- If a firm fails to meet the requirements for the matching adjustment then they cannot use it for two years.

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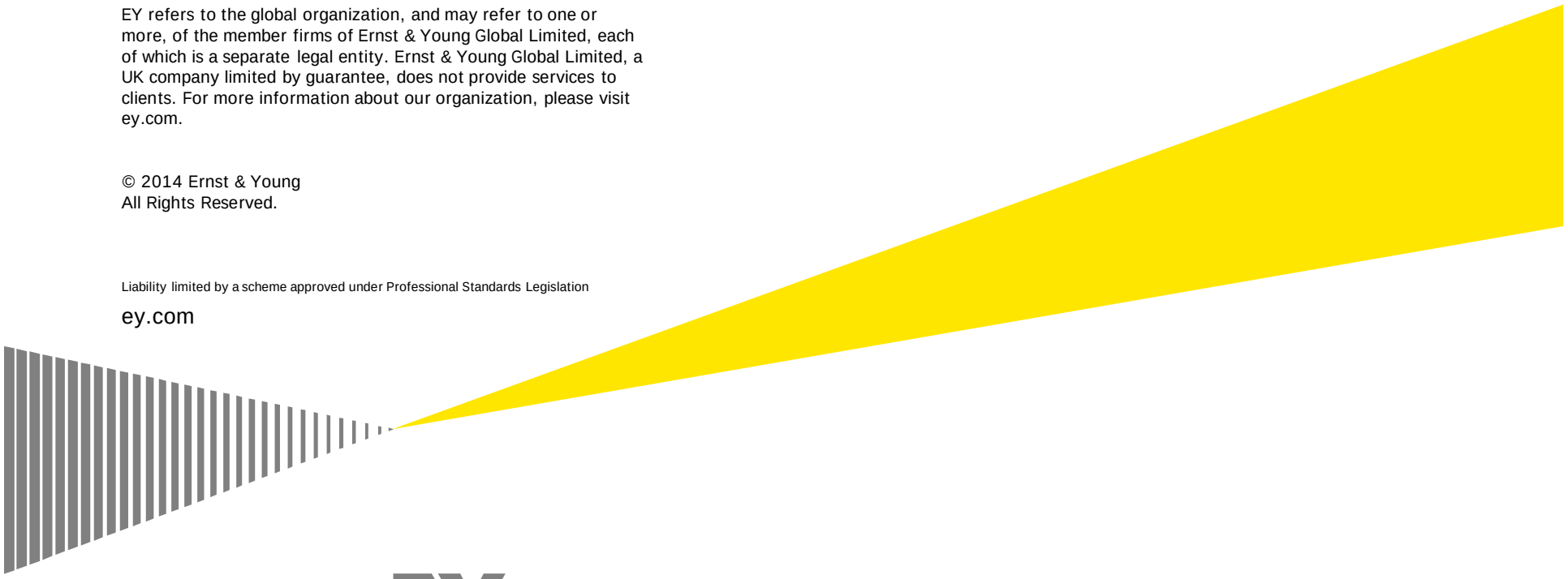

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