Esta publicación ha sido posible gracias al patrocinio de
Guy Carpenter & Cia., S.A.

Presentación

Al comienzo de esta tesina, apenas tenía unas breves pinceladas acerca de lo que Solvencia II podía repercutir en el valor de las obligaciones de una compañía aseguradora. Gracias al Máster y las horas de dedicación a esta tesina, he podido desgranar desde no más de un puñado de definiciones en unos borradores de lo que será la futura regulación, uno a uno los conceptos del cálculo de la Matching Premium y entender así las implicaciones que ello conlleva en la buena gestión del riesgo de una compañía, que a diferencia del resto de empresas, tiene a su disposición la confianza y los ahorros de sus clientes siendo por ello plenamente responsable más que ninguna otra, de parte de la seguridad económica futura de sus clientes.

Es importante señalar que el tema elegido está en constante evolución y por ello, toda la información aquí recogida es susceptible de ser actualizada en las próximas semanas. Este motivo ha dificultado la realización parcial de esta tesina derivado a que ninguna referencia ha sido formal, regulada, consolidada ni definitiva, además de haber ido evolucionando durante su estudio.

Quiero manifestar un sincero agradecimiento al Sr. D. José Luis Pérez Torres por su indudable interés en nuestro aprendizaje diario. A mi tutor Sr. D. Luis Portugal por sus contestaciones inmediatas a kilómetros de distancia y a mi empresa por darme esta oportunidad. Especialmente quisiera agradecer a M. A. Pérez por su confianza en mí, a J. Deulofeu y D. Foncubierta por sus ideas iniciales para arrancar este proyecto, a J. Montalbo por sus consejos y sus contactos y a J. Jardon por sus explicaciones y paciencia.

Quiero hacer especial mención a Seamos Creedon quien me ha provisto de información y consejo de forma completamente altruista y espontánea.

Asimismo quiero agradecer a mis padres, familia y todos aquellos amigos y compañeros que he desatendido durante este año de dedicación y trabajo a este Máster y en especial a Edgar, por su inmejorable sentido del humor, paciencia y cariño, sin el menor de los cuales no podría haberlo hecho mejor. Gracias.

Resumen

Dado que el nuevo entorno normativo nos obliga a valorar los activos y pasivos de las entidades a valor de mercado; ¿Por qué el valor actual de los pasivos debería de actualizarse a una curva libre de riesgo, sin tener en consideración la consecuencia que supone la tipología de gestión del riesgo de los activos asociados a sus pólizas que de manera diferente asume cada entidad? Solvencia II, concretamente el Nivel 2, incluye el concepto de **Matching Premium** en el cálculo de las obligaciones de pasivo de las entidades aseguradoras, como un diferencial positivo que premia la buena gestión del riesgo de liquidez, permitiendo actualizar el valor de las obligaciones futuras de las entidades, a un tipo de descuento más elevado, lo que supone una cantidad provisionada menor. Incluyendo dicha prima se pretende evitar la exposición a las fluctuaciones del día a día en el mercado de renta fija, dado que las aseguradoras mantienen, a priori, sus activos hasta vencimiento. Esto es lo que algunos países de la zona euro, como España, han defendido a raíz de la publicación de la Directiva. El objetivo de esta tesina se concentra en desagregar su cálculo, así como el impacto y las conclusiones a favor/en contra que el nuevo modelo de cálculo plantea.

Resum

Donat que el nou entorn normatiu ens obliga a valorar els actius i passius de les entitats a valor de mercat; Per què el valor actual dels passius hauria d'actualitzar-se a una corba lliure de risc, sense tenir en consideració el risc de les conseqüències que suposa la tipologia de gestió de risc dels actius associats a les seves pòlisses que de manera diferent assumeix cada entitat? Solvència II, concretament el Nivel 2, inclou el concepte de **MatchingPremium** en el càlcul de les obligacions de passiu de les entitats asseguradores, com un diferencial positiu que premia la bona gestió del risc de liquiditat, permetent actualitzar el valor de les obligacions futures de les entitats a un tipus de descompte més elevat el que suposa una quantitat provisionada menor. Incloent la citada prima, es proposa evitar que les asseguradores estiguin exposades a les fluctuacions del dia a dia al mercat de renta fixa, com a conseqüència de que les asseguradores mantenen, a priori, els seus actius fins a venciment. Això és el que alguns països de la zona euro, com Espanya, han defensat arrel de la publicació de la Directiva. L'objectiu d'aquesta tesina és correspon a desagregar tant el càlcul com l'impacte i les conclusions a favor/en contra del nou model de càlcul.

Summary

Since the new regulatory framework requires us to value the assets and liabilities of the entities at market value; Why the present value of liabilities should upgrade to a risk-free rate, without considering the result which represents the different typology of risk management of the assigned assets to policies that differently assumes each entity? Solvency II, Level 2 specifically, includes the concept of **Matching Premium** in calculating liability obligations of insurance companies, as a positive spread rewards good liquidity risk management, allowing it to update the value of the future obligations of the entities to a higher discount rate which means a lower amount provisioned. Including the matching premium will prevent exposure to fluctuations in daily bond market as a result of insurers remain, a priori, their assets until maturity. This is what some euro zone countries such as Spain, have discussed following the publication of the Directive. The aim of the thesis is disaggregate their calculation, as well as the impact and the conclusions for/against the new calculation model.

INDEX

I. INTRODUCTION: Importance of matching

Nearly 200 insurance companies actively operate in the Spanish territory. The main activity of these companies is to provide safety services covering certain risks. The contributions of many individuals exposed to adverse economic events allow them to accumulate wealth with which to address only some needs. This allows a statistical risk management from the economical point of view, but is kept individually from the legal point of view.

One of the objectives that the European project Solvency II aims is to protect the client ofinsurers insolvency. Because that, the regulatory fixed Solvency II capital requirements as well as standards of risk management, and has forced insurers to risk management that takes into account the volume and nature of risk.

Considering the objective of Solvency II, and based on the best way to inform the assessment of the entities, assets or liabilities are valued by their current market value, according to the best possible estimation. To this end the Directive and working papers associated with it, have defined, or are defining, due to the continuous updating of the drafts that regulate the methods of calculation. In particular, the technical provisions that reflect the payment obligations of the insurer against its insured, are subject to ongoing discussion in the final definition of his method of calculation. Based on the latest information available, the technical provisions, valued under the Directive shall be assessed according to Solvency II, as the Best Estimate Liabilities calculation and will be updated to the risk free rate, the Interest Rate Swap curve-IRS- . In addition to what the Directive raises some countries, including Spain, have defended what is predicted to be the new calculation, and this is set the IRS with counter-cyclical premium, where applicable, and a matching premium, where applicable. The goal that seeks both additional adjustments to the IRS is not disprove liabilities updating as a result of the constant fluctuating context we are living, but take into account the credit and liquidity risk of the assets allocated to the assigned portfolios.

Due to the behavior of the elements assigned to the portfolios of policies need not follow the behavior of the risk-free rate is applied counter-cyclical Premium, when EIOPA considers it, based on stress situation markets, or the matching Premium, considered as an addition to the risk free IRS that recovers the credit

spread and the expect loss in order to consider the actual value of the technical provisions. It explains that the more interest discount rate less technical provision the Companies may bear in mind.

The importance of matching premium is summarized in a spread that is added to the free discount rate to increase it, the current value of the supplies will be decreased, thereby reducing liability obligations to which the company will face.

Because of the complexity of calculating the matching premium, as the complexity of the control framework where its includes, worsened by the ever-changing, updating and ongoing discussion of regulatory changes that surround it. We have tried to explain the context in which we currently framed, based on Solvency II Directive, as in the Guide Level 2 and Level 3, as well as drafts and papers from experts who have been granted access. Finally we present the practical calculation that the legislation seeks to address, based on two formulas: theoretical formula, which requires reliable historical data and market experience, and the simplified formula for those entities that we have enought historical data to base its calculation on statistical methods based on real data.

To sum up, including the matching premium in Solvency II rules will prevent insurers being exposed to day-to-day fluctuations in the bond market. It says this should be the case because insurers hold assets until maturity.

II TECHNICAL PROVISIONS

II.I What are Technical Provisions?

Technical provisions represent the amount that an insurer requires to fulfil its insurance obligations and settle all expected commitments to policyholders and other beneficiaries arising over the lifetime of the insurer's portfolio of insurance contracts.[1]

II.II Tipology[2]

We can distinguish two main types: premium bond provisions and provisions for claims obligations. Among the former are the provision for unearned premiums, provision for unexpired risks and provisions for life insurance. The second type refers to the provision of services, in its various manifestations.

According to Spanish law of insurance and the general plan of insurance-accounting-PCEA, the distinction between provisions:

- **Provision for unearned premiums** or unearned premium reserve. Are those that aim to address the risks that remain in force at the end of the financial accounting. Must be formed by the portion of the premiums earned in the year to be allocated to the period between the closing date and the term of the coverage period.

This is calculated policy by policy, being constituted the basis of calculation for premiums earned in the year fee deducted, where applicable, the surcharge security. Recognition timing of the premium shall be in accordance with the claim timing to throughout the coverage period of the contract.

- **Provision for unexpired Risks** or premium deficiency reserve. To complement the provision for unearned premiums to the extent that the amount is not enought to reflect the assessment of all risks and expenses to be covered by the insurance that correspond to the period not elapsed from the date of closing of exercise.

- **Life assurance Mathematical provision**. The provision of life insurance should represent the value of the insurer's obligations net of policyholder obligations in respect of life insurance at the time of year-end.

The provision of life insurance include:

[1] Summary of IAIS positions on the valuation of technical provisions, October 2007
[2] Source definitions from Mapfre dictionary

- In insurance with a coverage period of not less than annually, the provision for unearned premiums and, where appropriate, provision for unexpired risks.

- In all other insurance, the mathematical, calculated as the difference between the actuarial present value of future obligations of the insurer and the policyholder or, where appropriate, the insured. The basis of calculation of this allowance will be the inventory premium accrued in the year. The provision of life insurance which has been contractually agreed that the investment risk is entirely taken by the policyholder is the **UnitLinked**, and it is determined by the assets specifically associates or indices or assets that have been set as a reference to determine the economic value of their rights.

- **Provision for bonuses and rebates** or book profit. Includes the amount of accrued benefits for policyholders, policyholders or beneficiaries and appropriate premiums returned to policyholders or insureds, if any, under performance experienced by the insured risk, while not assigned individually to each of those.

- **Claims provision** or reserve claims. The provision of benefits shall represent the total amount of outstanding obligations of the insurer arising from claims occurring prior to the closing date of the financial year as the difference between the total cost estimated or true and all amounts paid by reason of such claims. This shall comprise both external and internal costs of managing and processing records. Each incident will be subject to individual assessment, unless application of statistical methods.

  The claims provision include:

  - Provision for outstanding claims. Include the amount of those claims incurred and reported by year end.

  - Incurred but not Reported provision. It shall provide the estimated amount of claims incurred before year end and not included in the provision of outstanding performance or payment.

  - Internal handling costs reserve. Shall be provided for the amount sufficient to afford the entity's internal required for full completion of claims to be included in the provision of services.

  - Reopened claims provision.

Mathematical Provisions

Analysis of the thesis focuses on life insurance and specifically in the mathematical provisions. We therefore developed following characteristics.

The liability of an insurer, are the obligations stipulated in the insurance policies, according to a technique designed based by an actuary calculation. Technically, the mathematical reserve is determined as that part of the actuarial value of benefits that must be established at the attained age, depending on the assumptions of the plan and based on the normal development and successful of these.
At the time of contracting the insurance policy, the insured has not pay consequently the value of the corresponding mathematical provision is null:

$PM_{xe} = 0$

Where:

x_e the age of hiring

However, this balance between the initial commitments of the parties of the insurance contract does not exist subsequently, but at any time after initial and assuming the insured is alive, the average present value of expected commitments of the undertakings must be greater than the current value expected average of outstanding obligations of the insured.

For example, in case a hiring contract of savings insurance product such as the one that guarantees a regular income for life from the age of retirement from work (x_j) of amount B at that age of retirement, the value of future benefits had to be made to coincide provision with the actuarial present value of the retirement age of future benefits until the death of the insured (where Z is the age limit):

$$PM_{x_j} = (Va)_{x_j} = \sum_{h=x_j}^{\omega} B_h \cdot v^{h-x_j} \cdot {}_{h-x_j}p_{x_j}^{m}$$

where:

PM_{x_j} is the Mathematical Provision at the retirement age

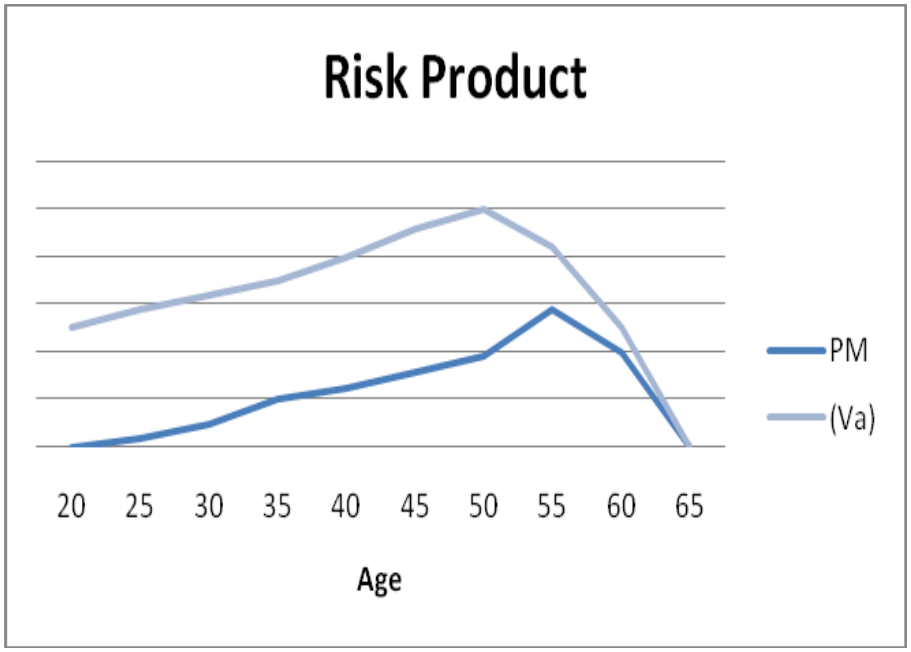
$(Va)_{x_j}$ is the actuarial present value of the retirement benefits at the retirement age

v^{h-x_j} is Financial update factor for a period of x_j-h years

${}_{h-x_j}p_{x_j}^{m}$ is the probability that a beneficiary of the retirement benefit is x_j years old age with life until h years old, being the death the only cause of termination of contract

On the other hand, in a hiring risk insurance product such as that guarantee a single capital amount B if the worker's death occurs before to retirement age (x_j), reaching that age retirement, the value of future benefits is also null, in the absence future risk of occurrence of the contingency, and being, therefore, the value the provision also zero:

$$PM_{x_j} = (Va)_{x_j} = 0$$



1. Example of value fluctuations between mathematical provisions and the present value of assets related to a life product of single capital.
Source: Author

But in a middle age between that age and the retirement age, the mathematical provision takes positive values because the value of the current contributions can still perform the policyholder is lower than the present value of potential damages would be paid if the accident happens.

II.III How to calculate the Mathematical Provisions today

To promote the insurance industry in Spain, included ROSSP specific rules, based on the principle of sufficiency of the technical provisions governing the interest rate applicable to life insurance operations and in the condition of commitments and assets and the assumption of investment risk by insured.

In fact, the interest rate used in both the technical basis of the insurance as in the calculation of the mathematical and the possibility that this is different from the initial one on the equivalence calculation for the determination of the premium for the product, have expressly acknowledged and detailed in Article 33 of Regulation.

This article was developed in the Orden Ministerial 23 December 1998 laying develop certain provisions of the regulation of private insurance and establishes the reporting requirements as a result of introduction of the euro. Subsequently, Royal Decree 239/2007 of 16 February 2007, modifying the ROSSP, modified the method for estimating the interest rate to calculate the provision of life insurance, and also for the Orden EHA/339/2007, which describes the integrated management of assets and liabilities, by immunizing techniques taking into account the conditions and requirements specific to immunizing strategies as those derived from the laws that constitute the framework that implement the correct models in the state insurer.

So is now established a mathematical model for the integrated assets and liabilities management, understood as a continuous process which has to select the optimum structure of the portfolio of financial assets to cover all liabilities or contractual obligations assumed by the insurer, considering the credit rating of asset-based risk involving insolvency, and not forgetting that at all times, both assets and liabilities are frequently naturally random(in the case of liabilities, according to the operations inherently actuarial life insurance).

III SOLVENCY II

III.I What's & Why?

The environment around us is full of daily uncertainties, economic losses, defaults, accidents, illness or even death. From the conceptual point of view, the insurance business controls in a macroeconomic sense, the transfer of risks between economic agents and others of them, and from the microeconomic point of view, minimizes or avoids the impact of harmful uncertainty.

Because all of these could be possible, and insurance business could be viable, is required to study the occurrence of claims, quantification of losses, to establish the price of premiums to make profitable business, and also requires maintaining a certain level of equity of the company making it possible to afford to pay all its commitments to policyholders without undermine the financial strength of the company. For this last reason, the European Commission has developed a project that notice the appropriate level of capital commitments and investments should have a company dedicated to these matters. This is what is commonly known as Solvency II.

Current European legislation and in use today is based on the calculation of a set of ratios based on the level of claims and the level of premiums and are applied equally by all insurers undertakings, regardless of their size and whatever profile of risk operations.

Some time ago, some countries considered the financial risks associated with the many different procedures of the insurance business. Internationally, the pioneers in this were the Finns in the 50's. However, it comes up to 80's in Canada and 90's in the United States when developing models try to cover the generality of risk. Specifically, the model of the States, the Risk Based Capital, is based on clear rules and principles and includes the risks of investing in fixed income, equities and real estate, credit, underwriting (provisions and claims paid) and subsidiaries. It is assumed that all these risks are independent except for subsidiaries that are considered fully correlated with the others.

Switzerland has been a country with an operative model so close to Solvency II: focus on the protection of the insurer client and based on three stakes like Pillars. This model evaluates the assets and liabilities to market value. The final objective is quit close to Solvency II: define a minimum capital and a target capital.

But consolidate in one way for all the countries at the European Union about how to proceed, what will be done, how is to be carried out and how far it can go is not easy to determinate at all. For this purpose, the Commission decided,

and the member States had accepted, to carry out Solvency II use Lamafalussy approach.

In general, its structure of implementing the regulation process concerns four levels, which, in this case would be:

- Level 1: The European Commission began the process to create the Directive after a full consultation process with the European Parliament and Council. At this level are agreed regulatory principles of work and how far they can get the powers of those who are responsible with the task to prepare the standard.

- Level 2: After consultation with the EIOPC -European Insurance and Ocupational Pensions Committee-, the European Commission requested technical assistance from CEIOPS -Committee of European Insurance-and Ocupational Pensions Supervisors- for the setting-up of technical measures. Following consultation with market participants, end users and consumers, CEIOPS is preparing a set of measures that communicates to the European Commission. The Commission examines and raises a proposal to EIOPC which will finally decide. If such proposals are accepted by the EIOPC, the European Commission adopted measurement.

- Level 3: Focuses on CEIOPS, now named EIOPA, work on recommendations guidelines, common processes, focus groups and in the comparing the monitoring methods in order to achieve a greater convergence towards the target. That's the state where nowday we are.

- Level 4: The European Commission monitors that the members States comply with EU law and can take legal action against those who breach it.

III.II Regulation

Directive framework

The Solvency II Directive was adopted by the Council of the European Union and Parliament in November 2009: *Directive 2009/138/EC of the European Parliament and of the Council.*

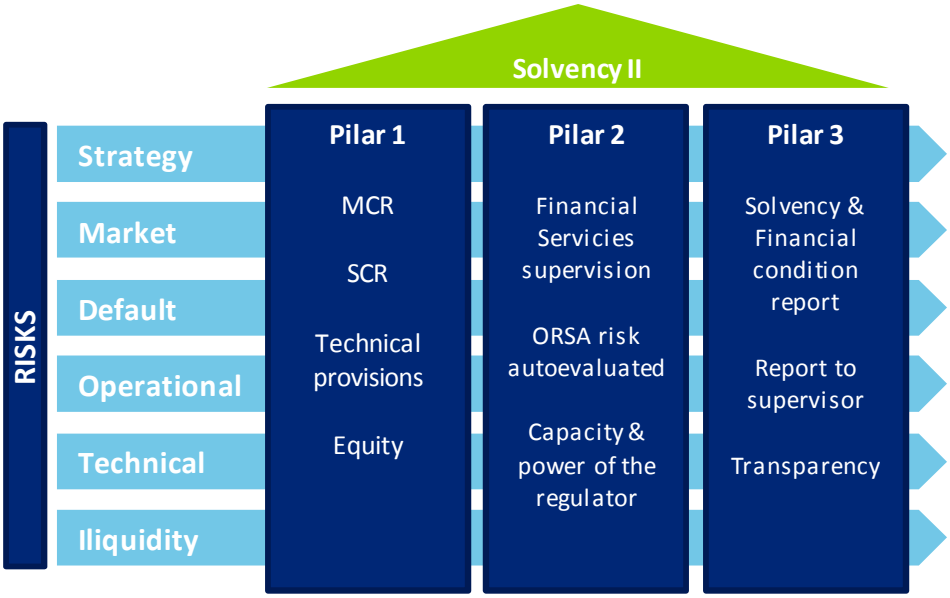
Solvency II refines risk control procedures of insurance, which have already demonstrate their effectiveness against the financial crisis, and therefore allows a better management for the insurance industry and consumer protection, in so far that the main purpose of supervision is to protect them.

Solvency II reorganized and modernized the entire European insurance regulatory environment because, when in its place, will become the basic standard in the industry. The main change with from Solvency I is that it establishes a new solvency margin, which will be dynamic, rather than a fixed percentage as at present, and reward companies that manage their risks better.

This is particularly interesting for the Spanish market, which already have a highly effective risk management.

Solvency II framework has three main areas:

- **Pillar 1** consists of the quantitative requirements, like the amount of capital an insurer should hold.
- **Pillar 2** sets out requirements for the governance and risk management of insurers, as well as for the effective supervision of insurers.
- **Pillar 3** focuses on disclosure and transparency requirements.

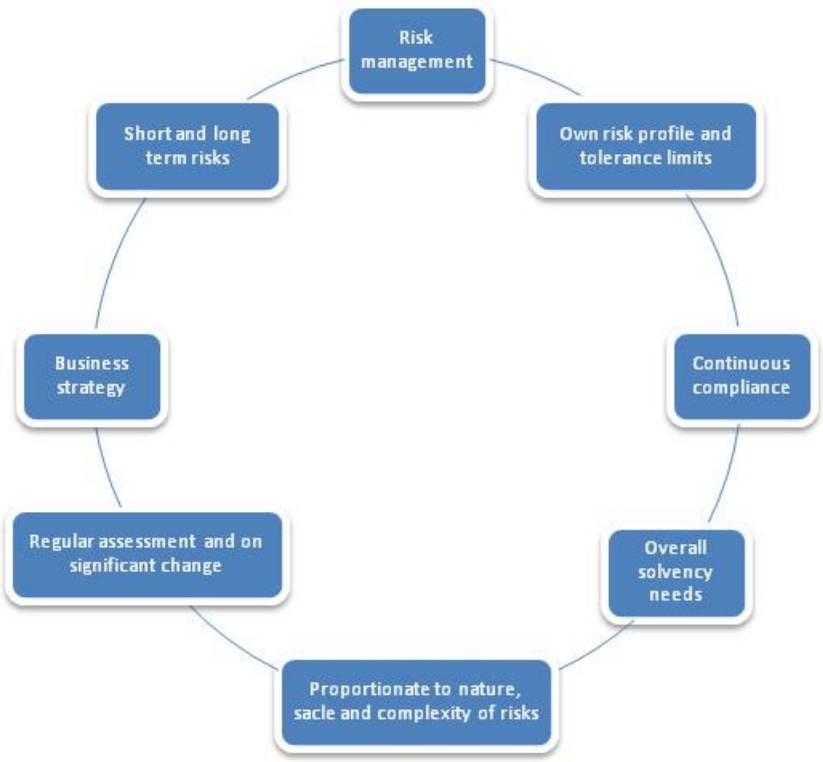


2. Solvency II Framework
Source: Deloitte and Author

ORSA

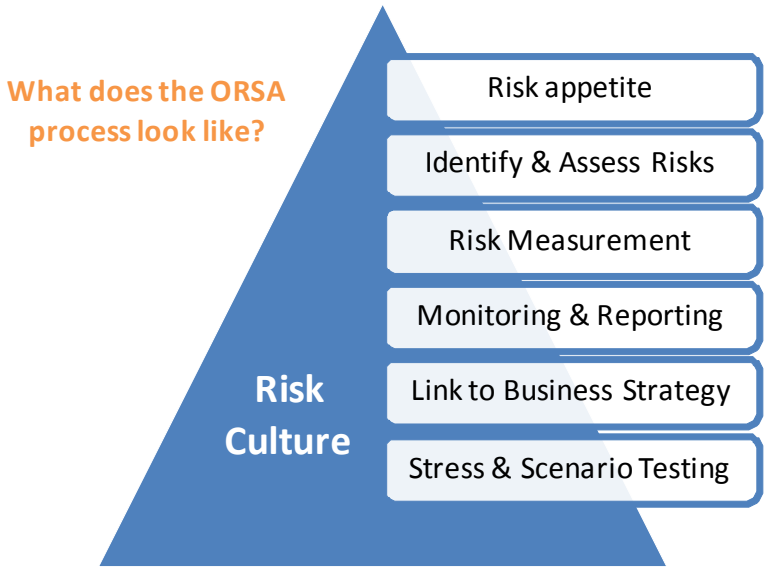
Articles 44 and 45 of the Solvency II Directive prescribes a Own Risk and Solvency Assessment –ORSA- as part of Risk Management System for Insurers and Reinsurers.ORSA is an internal assessment process within the undertaking and is as such embedded in the strategic decisions of the undertaking. It is also a supervisory tool for the supervisory authorities, which must be informed about the results of the own risk and solvency assessment of the undertaking.

But what is an ORSA: ORSA can be defined as the set of processes and procedures used to identify, assess, monitor and manage, and report the risks of short and long faced or may face an insurer, and to determine shareholders'equity required to ensure that at all times compliance with the solvency requirements, including assets, technical provisions, regulatory capital requirements (SCR and MCR) and internal capital requirements.



3. ORSA maintasks
Source: Author

Solvency II is a model based on risk, and ORSA represents, above all, knowledge and opinion that an insurer has its risks, solvency requirements and capital.



4. ORSA culture
Source: Author

EIOPA

The European Insurance and Occupational Pensions Authority –EIOPA- was established in consequence of the reforms to the structure of supervision of the financial sector in the European Union.

EIOPA is part of a European System of Financial Supervisors that comprises three European Supervisory Authorities, one for the banking sector, one for the securities sector and one for the insurance and occupational pensions sector, as well as the European Systemic Risk Board.

EIOPA's core responsibilities are to support the stability of the financial system, transparency of markets and financial products as well as the protection of policyholders, pension scheme members and beneficiaries. EIOPA is commissioned to monitor and identify trends, potential risks and vulnerabilities stemming from the micro-prudential level, across borders and across sectors.
EIOPA and its predecessor, CEIOPS, have been advising the European Commission on the project in its various stages of development since 2004.

EIOPA has been drafting the guidelines and standards to support the implementation of the new regime, the Directive. This guidelinesare known as Level 2.

5. Regulation and Supervision[3]
Source: EIOPA

The standards and guidelines are expected to cover the following areas:

- ✓ Internal models, Solvency capital requirements, Own funds, Technical provisions, Valuation of assets and liabilities
- ✓ Groupsupervision
- ✓ Supervisory transparency and accountability, Reporting and disclosure
- ✓ Governance, ORSA
- ✓ Supervisory review process

[3]Source from EIOPA website

EIOPA's advice has been accompanied by five Quantitative Impact Studies – QIS-. The European Commission has requested EIOPA to run the QIS exercise and publish a report on the results of that exercise in order to provide quantitative input to the finalization of the Commission's proposal on level 2 implementing measures for the Solvency II Framework Directive.

OMNIBUS

Omnibus law amends state laws with a double objective: adaptation to the Services Directive and the comprehensive reform of the regulation of the most important sectors of economy: services. Fundamentally, there are new ways to control the activity more effectively but less burdensome for citizens and businesses.

Specifically, in insurance, the Omnibus II Directive will set the date of entry into force of the Solvency II regime as well as the scope of the technical standards to be drafted by EIOPA.

EIOPA strongly supports, within the constraints of the final decisions of the Parliament and Council on the timeline and the scope of the technical standards, the entry into force of Solvency II from 1 January 2014 and will make every effort to secure this.

From late Autumn 2012, this timeline should allow EIOPA, its members and the industry to prepare for the implementation of Solvency II. In the meantime EIOPA is engaging with its Insurance and Reinsurance Stakeholder Group as part of EIOPA's preparation of draft guidelines and technical standards. In addition, EIOPA aims to support supervisors and undertakings in specific areas.

For example, preparing for the efficient and timely approval of internal models for the calculation of the solvency requirements by introducing the possibility of pre-applications for internal models during the rest of 2012 and the flexibility for receiving applications from 1 January 2013 onwards.[4]EIOPA commitment is organized written consultations, in order to receive comments from all interested parties, including market participants, consumers and other end-users.

Briefing Papers

The briefings papers are prepared in order to facilitate discussion of the appropriate policy response to the challenges posed to financial security programs by the continuing volatility of financial markets. Specifically it is intended to facilitate discussion of how the European institutions may proceed withimplementation of the Solvency II framework despite continuing market volatility.

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[4] **"EIOPA's timeline for Solvency II„ from https://eiopa.europa.eu**

TheSolvency II framework -directive 2009/138/EC- is in large measure based on and isconsistent with principles of solvency assessment originally developed by the International Actuarial Association. The actuarial profession believes the interests of citizens will be served by the earliest possible implementation of the Solvency II framework.

Most part of this thesis has been based on the publish brieging and consultation papers.

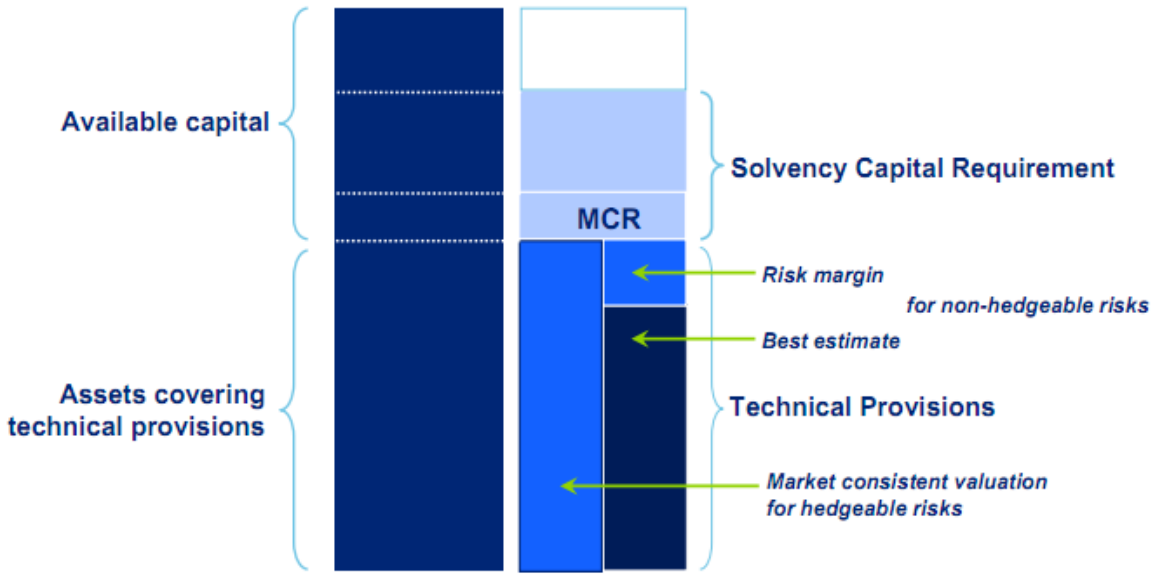
III.III How to calculate MP on Solvency II

Best Estimate Liabilities

In Solvency II, the quantitative requirements for insurance companies are based on an economic balance sheet approach. This approach requires liabilities to be valued at the amount for which they could be transferred, or settled, between knowledgeable and willing parties. In particular, the market-consistent value of technical provisions is determined by adding a risk margin to the company's "best estimate" of the value of their insurance and reinsurance obligations. Realistic assumptions and appropriate actuarial techniques are essential for calculations of company-specific best estimates.

Best Estimate

According to Article 76 of the Directive, the value of technical provisions shall be equal to the sum of a best estimate and a risk margin.
For hedgeable risks, the liability valuation can be deduced from the corresponding market prices. However, for non-hedgeable risks, for example, insurance risk or operational risk, it is necessary to develop an explicit methodology to calculate the risk margin.



6. Balance sheet: Solvency II outlook
Source: EIOPA

The best estimate shall correspond to the probability-weighted average of future cash-flows, considering the time value of money -expected present value of future cash-flows-, using the relevant **risk-free interest rate term structure**.

The calculation of the best estimate shall be based upon up-to-date and credible information and realistic assumptions and be performed using adequate, applicable and relevant actuarial and statistical methods.

The cash-flow projection used in the calculation of the best estimate shall take account of all the cash in- and out-flows required to settle the insurance and reinsurance obligations over the lifetime thereof.

The best estimate shall be calculated gross, without deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles.

Company-specific best-estimate mortality and morbidity rates form the basis for projecting realistic claims cash flows. Apart from Solvency II requirements, such best-estimate rates are used for several other tasks within a life company, e.g. Embedded Value, IFRS, monitoring, pricing, reserving and profit testing.

According to the Solvency II Directive, the Best Estimate Liabilities will be up-dated under the risk-free interest rate curve of provisions. As later we will detail, the working papers and measures of Level 2 and 3, develop a parallel calcula-tion, which the risk-free interest rate is not the only requirement to upgrade. Hence the existence of the proposal developed in the Matching Premium.

Risk-Free Interest Rate Term Structure

The rates of the relevant risk-free interest rate term structure to calculate the best estimate with respect to insurance or reinsurance obligations shall be calculated[5] as the sum of:

- the rates of a basic risk-free interest rate term structure;
- where applicable, a counter-cyclical premium
- where applicable, a matching premium.

The relevant risk-free interest rate term structure shall be calculated separately for each currency and maturity, based on information and data relevant for that currency and that maturity. It shall be determined in a transparent, prudent, reliable and objective manner.

The term structure of interest rates describes the differing yields to maturity – YTM- on similar securities, with yields typically being higher the longer the period until maturity. For example, a securitie with a 6-month maturity might carry a 2.02[6]percent yield, while a 10-year bond bought at the same time may yield a 6.65[6]percent return. When such a difference exists, it is known as a term premium. Government Bonds are generally used to map the term structure of interest rates (i.e., the yield curve) because they are virtually free of default risk.

[5] As referred to in Article 77.2 of Directive

[6] Source from Spanish Treasury website at 08.2012

III.IV Calculation steps on Solvency II

Risk Free Interest Rate Term Structure=
Basic risk-free interest rate term structure + or(counter cyclical premium; matching premium)

Interest rate for actual value of liabilities

In reference with the calculations steps before the European Directive explain that the rates of the basic risk-free interest rate term structure shall meet all of the following criteria:

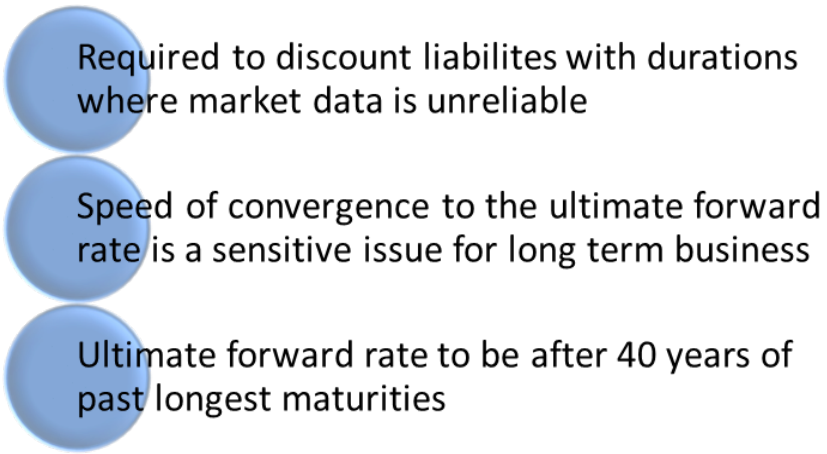
1. they are free of any risk;
2. insurance and reinsurance undertakings are able to earn the rates in a risk-free manner in practice;
3. the rates are reliably determined based on financial instruments traded in a market meeting the criteria of transactions involving a large quantity of financial instruments used in the replications without significantly affecting the price, also the financial instruments can readily be converted through an act of buying or selling without causing a significant movement in the price, and current trade and price information is readily available to the public (quantitiy-deep, liquidity, transparency).

For each currency, **the basic risk-free interest rate term structure** shall be derived, where appropriate, **on the basis of interest rate swap rates adjusted** to take account of the credit risk and the basis risk of the corresponding interest rate swaps. For this purpose basic risk shall mean the risk of loss or of adverse change in the financial situation of the holder of the interest rate swaps, resulting from the mismatch between the cash in-flows and the cash out-flows of the interest rate swap. The adjustments shall reflect the current market conditions.

For each currency, for maturities where interest rate swap rates are unavailable or such rates are not available from markets that satisfy the criteria explained before, government bond rates adjusted shall be used to derive the basic risk free interest rate term structure referred.

Extrapolation

For each currency, the basic risk-free interest rate term structure shall be determined on the basis of all relevant observed market data. Where the markets for the relevant financial instruments from which the risk-free rates are derived do not meet the criteria set out before for longer maturities, the basic risk-free interest rate term structure for these maturities shall be extrapolated according to:



7. Extrapolation development
Source: EIOPA and Author

1. Shall be based on forward rates converging smoothly from one to the longest maturities for which the relevant financial instruments and the bonds in that currency can be observed in a deep and liquid market to an ultimate forward rate.
2. The principles applied when extrapolating shall be the same for all currencies
3. The extrapolated part of the basic risk-free interest rate term structure shall converge in such a way to the ultimate forward rate that for maturities 40 years past the longest maturities referred to in paragraph 1 the extrapolated forward rates do not materially differ from the ultimate forward rate. The ultimate forward rate referred shall be stable over time and only change because of changes in long-term expectations. The methodology to derive the ultimate forward rate shall be clearly specified to make the performance of scenario calculations by insurance and reinsurance undertakings possible. It shall be determined in a transparent, prudent, reliable and objective manner. The ultimate forward rate shall take account of expected inflation.

Counter-cyclical premium

The **counter-cyclical premium shall be zero** for all maturities except during periods of stressed financial markets as determined by EIOPA. EIOPA shall determine the existence of a period of stressed financial markets if:

1. a material part of the spread between the rates of credit risk-free liquid assets and the rates of assets in the portfolios attributed to the illiquidity or a credit spread exceeds;
2. it is demonstrated that the illiquidity or excess credit spread of the assets, is more likely than not to result in undertakings selling a large part of those assets unless a counter-cyclical premium is taken into account in discounting technical provisions
3. there is a fall in financial markets which is unforeseen, sharp and steep.

If EIOPA has determined that stressed financial markets exist the insurance and reinsurance undertakings shall use the counter-cyclical premium. EIOPA may decide to increase or decrease the counter-cyclical premium at the beginning of each quarter thereafter. However, during the first year thereafter EIOPA shall not decrease the counter-cyclical premium regardless of the conditions set out.

The counter-cyclical premium shall be calculated as a portion of the spread between the interest rate that could be earned from assets included in a representative portfolio of assets that insurance and reinsurance undertakings are invested in and the rates of the basic risk-free interest rate term structure. The portion shall not be attributable to a realistic assessment of expected losses or unexpected credit risk on the assets and shall not be attributable to any other risk.

The counter-cyclical premium shall not be applied to insurance and reinsurance obligations where the relevant risk-free interest rate term structure to calculate the best estimate for those obligations includes a matching premium. If insurance and reinsurance undertakings calculate all or a material part of their technical provisions with a relevant risk-free interest rate term structure that includes a counter-cyclical premium larger than zero, they shall inform to the supervisory authority.

Overview	QIS 5 Approach	Proposed Approach
•This would allow firms to use a higher rate to discount liabilities in times of financial stress •Provides EIOPA discretion to make an adjustment to the risk free rate in distressed market conditions •Aims to reflect temporary distortions in spreads caused by illiquidity of the market widening of credit spreads	•The counter-cyclical premium was a new concept since QIS5 •Along with the matching premium (see below) intented to replace the liquidity premium	•Sitll uncertain exactly how counter-cyclical premium will be calculated •EIOPA can change the counter-cyclical premium on a quarterly basis

8. Cyclical premium development
Source: Eiopa and Author

IV MATCHING PREMIUM

IV.I What's that

It is an adjustment to the value of long-term liabilities held by insurers, such as annuities, to take account of assets they already hold.

Contextualization

The global solvency assessment framework developed was conceived of as a set of principles which each country's supervisor could use its own judgment to implement in a manner appropriate to the circumstances of its own history and its own financial and economic circumstances. Solvency II is of course much more ambitious, seeking to apply a detailed framework of rules to some 5,000 insurance undertakings operating in 27 countries. Some of these countries are fully sovereign in economic management while others operate on a basis of pooled sovereignty, the 'eurozone'. Implementing such a massive undertaking would be challenging in an era of stable markets, and the challenge is greatly magnified by current instability.

Lack of equilibrium

There are two trends greatly complicating the implementation of a common solvency assessment framework:

- The decline to an historically very low level of yields on safe assets and attributed to global imbalances;

- Historically very high levels of volatility as measured by VIX[7]

These trends have been hugely exacerbated by a lack of clarity regarding the creditworthiness of sovereign debt and bank debt in part or all of the Eurozone. This has led to inconsistency in asset valuation as reported by the ECB[8] in its latest Financial Stability Review. An obverse of the flight to safe assets is elevated spreads on risky fixed income securities such as corporate bonds and similar assets.

Unstable outlook

Although recent action by the ECB has calmed markets at time the outlook looks remain unstable:

[7] **VIX** is a trademarked ticker symbol for the Chicago Board Options Exchange Market Volatility Index, a measure of the implied volatility of S&P 500 index options. It represents one measure of the market's expectation of stock market volatility over the next 30 day period.

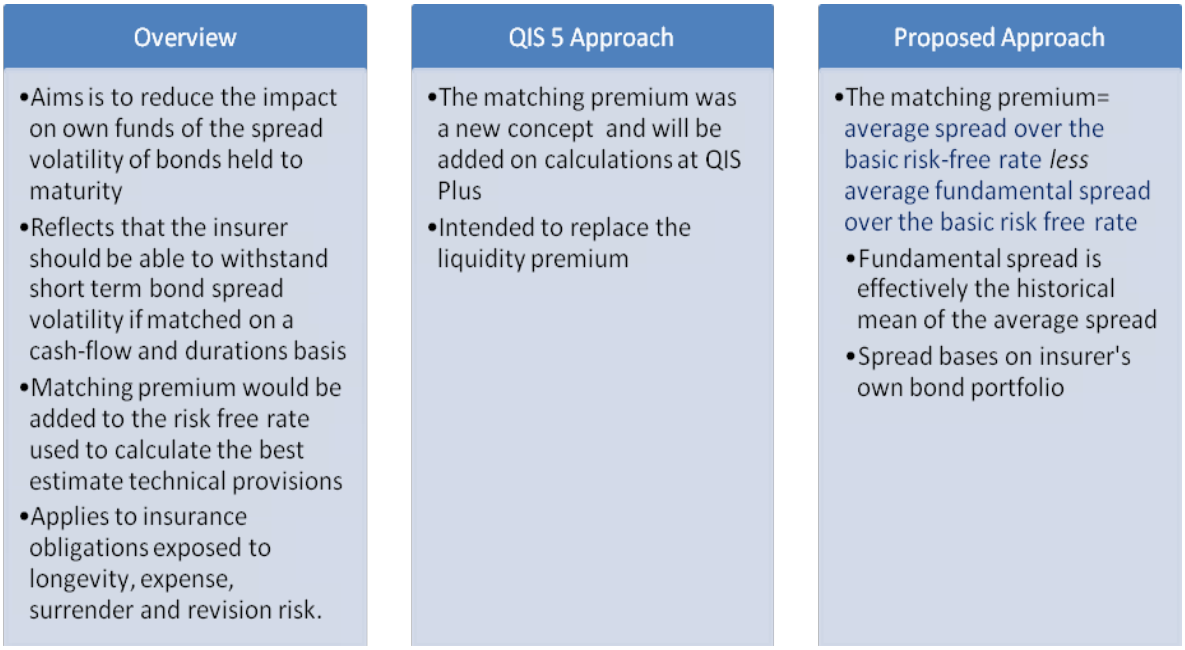
[8] ECB, European Central Bank

- Peripheral countries seem likely to come under renewed market pressure with uncertain implications for sovereign debt appetite and for sustaining the Eurozone;

- Central bank balance sheets have expanded considerably and it is not clear how or when this support may be wound down; and

- Banking systems remain unstable as Europe effectively accelerates implementation of Basel III and individual countries implement their own initiatives.

Part of the difficulty lies in historic liabilities may have been assumed for the undertakings in very different conditions, guaranteed high interest rates.
The Solvency II framework is designed to incentivize undertakings to manage the risks associated with liability origination in future, including a cautious approach to offering guarantees in volatile markets.



9. Matching premium development
Source: Eiopa and Author

Application of the matching premium

The risk-free interest rate to calculate the **best estimate** of a portfolio of insurance obligations shall include a matching premium, determined in accordance with the matching premium steps of calculation, provided that the following **conditions** relating to the insurance obligations and the assets covering them are met:

- the insurance undertaking has assigned a portfolio of assets, consisting of bonds and other assets with similar cash-flow characteristics, to cover the best estimate of the portfolio of insurance obligations and intends to maintain this assignment over the lifetime of the obligations, except when

replicated cash flows between assets and liabilities have materially changed such as the default of a bond;

- the portfolio of insurance obligations and the assigned portfolio of assets are ring-fenced, managed and organised separately from the other activities of the undertakings;
- the future cash-flows of the assigned portfolio of assets replicate each of the expected future cash-flows of the portfolio of insurance obligations in the same currency; any mismatch shall not give rise to risks which are material in relation to the risks inherent in the insurance business to which a matching premium is applied;
- the insurance contracts underlying the portfolio of insurance obligations do not give rise to future premium payments;
- where cash-flows of the insurance obligations depend on inflation, the insurance undertaking may use assets that replicate the expected and unexpected cash-flows of the portfolio of insurance obligations;
- the cash-flows of the assets of the assigned portfolio of assets cannot be changed by the issuers of the assets or any third parties;
- no assets of the assigned portfolio of assets shall have a credit quality which has been assigned to credit quality step 4 or worse in accordance with the current and official legislation or in accordance with the insurance undertaking's own rating of the credit risk of the counterparty of the assets;
- the value of the assigned portfolio of assets with a credit quality which has been assigned to credit quality step 3 in accordance with the law or in accordance with the undertaking's own rating shall be less than 30 % of the total value of the assigned portfolio of assets
- notwithstanding last point, the value of the assigned portfolio of assets that meet the following criteria and were purchased by the undertaking after 31 December 2012 shall be less than 15 % of the total value of the assigned portfolio of assets
- at the time the asset entered the assigned portfolio of assets, the credit quality of the asset was assigned to credit quality step 3,since entering the assigned portfolio of assets, the credit quality of the asset was assigned to credit quality step 3 or worse;
- the insurance undertaking has declared to the supervisory authority that it applies the matching premium to the portfolio of insurance obligations and that the requirements set out in the last points are complied with.
- Insurance and reinsurance undertakings that apply the matching premium to a portfolio of insurance obligations shall not choose to revert to the approach that does not include a matching premium. Where an insurance undertaking that applies the matching premium is no longer able to comply with the conditions set out, it shall immediately inform the supervisory authority and take the necessary measures to restore compliance with these conditions. Where the undertaking is not able to restore compliance with these conditions within two months it shall cease

applying the matching premium to any of it insurance obligations and shall only be able to apply the matching premium again after a period of 24 months.

If all or any of the above conditions are not met, the matching premium could not apply and therefore the provisions would increase its value. This would lead unnecessarily to a range of unintended adverse social and macro economic impacts:

- Shift from longer term to shorter assets
- Move away from long term guaranteed products
- High charges for policyholder passed on from unnecessarily high capital requirements

Calculation of the matching premium

The **matching premium** shall be equal to the difference of the following:

- the annual effective rate, calculated as the single discount rate that, where applied to the cash-flows of the portfolio insurance obligations, results in a value that is equal to the value in accordance with the **rules relating to the valuation of assets and liabilities and technical provisions**[9] of the portfolio of assigned assets, excluding any assets in excess of that;

- the annual effective rate, calculated as the single discount rate that, where applied to the cash-flows of the portfolio insurance obligations, results in a value that is equal to the value of the **best estimate of the portfolio of insurance obligations** where the time value is taken into account **using the basic risk-free rate term structure**.

	Rates	Liabilities	
Dates	**at 30/09/2012**	**Flows**	**IRR Liabilities**
30/09/2012			1,99%
31/10/2012	1,61%	1.012.378	
30/11/2012	1,54%	1.010.113	
31/12/2012	1,50%	1.011.038	
31/01/2013	1,47%	1.009.187	
28/02/2013	1,45%	1.006.996	
31/03/2013	1,45%	1.004.180	
30/04/2013	1,46%	1.003.778	
31/05/2013	1,47%	1.000.411	
30/06/2013	1,50%	998.213	
31/07/2013	1,53%	997.785	
31/08/2013	1,57%	997.355	

[9] "liabilities shall be valued at the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm's length transaction" referred at Article 75 of Directive 2009/138/EC

30/09/2013	1,61%	996.920
31/10/2013	1,66%	995.674
30/11/2013	1,72%	995.473
31/12/2013	1,77%	1.115.353
31/01/2014	1,83%	1.113.581
28/02/2014	1,90%	1.112.099

10. Expected cash flows[10]
Source: Author

Following we present the calculation standard formula:

Matchingpremium=

$$APR_x - APR_y$$

Where,

$$\mathbf{APR_x} = \frac{CF_1}{(1+R_a)^1} + \frac{CF_2}{(1+R_b)^2} + \ldots + \frac{CF_n}{(1+R_z)^n}$$

$CF_{1\ldots n}$ Cash Flows according the Market Value referred at Article 75 of Directive 2009/138/EC

$R_{a\ldots z}$ Market interest rate according the assigneds assets of the portfolio

$$\mathbf{APR_y} = \frac{CF_1}{(1+R_0)^1} + \frac{CF_2}{(1+R_0)^2} + \ldots + \frac{CF_n}{(1+R_0)^n}$$

$CF_{1\ldots n}$ Cash Flows according the Best Estimate calculation

R_0 Risk-free rate term structure

Source: Author

The **bestestimate** shall correspond to the probability-weighted average of future cashflows, taking account of the time value of money, expected present value of future cash-flows, using the relevant risk-free interest rate term structure.

The calculation shall be based upon up to date and credible information and realistic assumptions and be performed using adequate, applicable and relevant actuarial and statistical methods.

[10] The value of technical provisions to the referred cash flows shall correspond to the current amount insurance companies would have to pay if they were to transfer their obligations immediately to another insurance undertaking

The expected cash-flow of the asset is taken into account in accordance with a probability of default that corresponds to the **fundamental spread** and **a loss-given-default**.

The **fundamental spread** of a specific asset shall be equal to the sum of the following:

- the credit spread corresponding to the **probability of default** of the asset;
- a spread corresponding to the **expected loss** resulting from downgrading of the asset;

The **credit spread** referred shall be based on the assumption that in case of default 30% of the market value can be recovered.

The **probability of default**–PD- should be based on long-term default statistics considering its duration, credit quality step and asset class.

The **fundamental spread** should not be lower than 75 % of the long-term average of the spread over the basic risk-free interest rate of assets of the same duration, credit quality step and asset class, as observed in financial markets. The long-term average shall be based on data of the last 30 years.

The **expected loss**–EL- shall correspond to the probability-weighted loss the insurance undertaking incurs if the asset is downgraded to a lower credit quality step and is replaced immediately afterwards. The calculation shall be based on the assumption that the replacing has the same cash-flow pattern as the replaced asset before downgrade, also the replacing asset belongs to the same asset class as the replaced asset and has the same credit quality step as the replaced asset before downgrade or a higher one.

Simplified calculation of the matching premium

Notwithstanding the explanation before, insurance undertakings may calculate the matching premium as the difference between the following:

- the average spread over the basic risk-free interest rate of the assets of the assigned portfolio of assets, weighted with the products of the duration of the assets and the value of the assets in accordance with Article 75 of Directive 2009/138/EC;

- the average fundamental spread over the basic risk-free interest rate of the asset of the assigned portfolio of assets, weighted with the products of the duration of the assets and the value of the assets in accordance with Article 75 of Directive 2009/138/EC.

Following we present the simplified calculation formula:

$$\textbf{Matchingpremium} = AS - AFS$$

Where,

$$\textbf{Average Spread (AS)} = \sum (YTM - IRS) * \frac{\text{Assets duration}}{\Sigma \text{ Total Duration of Porfolio}} * \frac{\text{Marketvalue of assets}}{\Sigma \text{ Total Market Value of Portfolio}}$$

$$\textbf{Average Fundamental Spread (AFS)} = \sum ((PD + EL) - IRS) * \frac{\text{Assets duration}}{\Sigma \text{ Total Duration of Porfolio}} * \frac{\text{Marketvalue of assets}}{\Sigma \text{ Total Market Value of Portfolio}}$$

Source: Author

IV.II Economical consideration of determination "matching adjustment"

There are two different schools of thought about the dimensions of the problem to use or not the matching premium:

- The 'actuarial' school considers the 'matching premium' (to be added to the risk-free discount rate in respect of matchable liabilities) to be in the nature of an incentive to encourage customers and firms to originate and manage commitments which can be matched with reasonable confidence by long-term illiquid investment;

- The 'accountancy' school considers the variation of the matching premium in response to asset volatility in order to remove what it considers to be false volatility from income statements and balance sheets. This current argument -reflected in draft Level 2- calculates the matching premium by reference to yields in respect of a designated portfolio of assets held by the particular insurer. This has the unfortunate consequence that the same commitment may carry a different provision in one firm as compared with another depending on the portfolio of matching assets held by each.

Both schools consider the same: the matching adjustment should not encourage imprudent exposure to credit risk and should over time broadly reflect the market price of liquidity, the valuation differential between similar liquid and illiquid assets. That differential has been unusually volatile in recent years and the matching adjustment should vary so as to reflect this.

The actuarial profession has suggested that responsibility for regular calculation of an appropriate matching adjustment to apply to defined elements of provisions should fall to EIOPA. EIOPA should, in accordance with long-established actuarial practice, determine the premium by reference to:

- The spread over risk-free on representative portfolios of investment grade assets of stipulated mix of credit quality and liquidity; less

- The expected annualised cost of adverse credit events in respect of similarly representative portfolios based on representative historic data; less

- A risk margin reflecting the cost of capital required to meet potentially extreme adverse variations in adverse credit event experience in respect of the similar portfolios.

The premium should vary by duration indicating that it tends to increase very slowly with longer duration but the effect may not be material.

The simple and transparent approach will have the effect that the resulting premium will greatly reduce residual volatility reflecting the matching strategy followed by individual firms. It also has the implication that undertakings are not motivated to increase asset risk in order to maximise the premium.

Under present proposals 42% of insurers expected to reduce allocations to long-term debt and 35% expected to increase allocations to short-term debt. A consistent premium should be incorporated in ‘mark to model’ valuation of illiquid assets.

V CONCLUSIONS

The Level 2 of Solvency II includes the concept of Matching Premium in the calculation of the liability obligations of the insurers, as a positive spread rewards of a good management of counterparty risk. We have presented in this papers how to represent effectively in two formulas the calculation described by the working groups.

Due to the breakdown of the formula represented and concluded, we have seen one by one the inputs that impact in the calculation of the matching premium. Despite the difficulty of finding all the elements that a draft of the formula shows, the purpose of it, why many countries including Spain has struggled to defend, is because the matching premium is a positive spread to the insurer enterprises who have a good risk management. Allowing it to update the value of future liabilities of the entities to a higher discount rate to lower amount provisioned.

11. Conclusions of using Matching Premium
Source: Author

Finally, the regulator idea has always been rewarding the correct risk management, so that all the companies involved in this relevant sector are responsible of managing theclient's savings that have been entrusted. So we can say that the matching premium reflect the market price of liquidity avoiding inappropriate credit risk exposure.

In summary the general idea to preserve a good management of risk develops the role of life insurers as long-term debt investors, optimally balanced protection of customers and maintains of a diverse and stable financial system.

V.I Next steps of regulation

This thesis has been based on the information available at the reporting date. It is expected that by the end of 2012 the European Commission will present the final regulation derived from consultation papers used here.

Below there are expose the list of conclusions group by theme.

V.II Reasons to use MP

- ✓ Allow a clear economic incentive for insurers to minimize liquidity risk inherent in contracts mainly focus at long-term security for customers;

- ✓ Contributes to financial stability by reducing inappropriate insurer balance sheet volatility;

- ✓ Promote liability valuation with less obligation under a good management.

- ✓ Protecting Long Term Guarantees and Long Term Investing: Solvency II has the potential to be a very powerful regulatory framework, but unless it is appropriately implemented it also brings a real danger that Solvency II unintentionally creates difficulties for insurance companies to offer long term guarantees and to invest in long term assets.

V.III ACT conclusions

The actuarial profession proposes:

- ✓ For commitments entered into after the date of implementation of final Solvency II, the basic risk-free interest rate should be substantially as set out in draft Level 2 text and in the current EIOPA pre-consultation and should make use of extrapolation techniques as part of the transitional approach.

- ✓ Also for future commitments, EIOPA should publish a parallel term structure to be applied to commitments meeting specified criteria of illiquidity and predictability. The parallel structure should be derived from consideration of the value of secure funding in creating potential for additional yield from investment in good quality illiquid assets and should exclude any element of compensation for expected or unexpected credit risk. A transition in respect of historic illiquid and predictable commitments may bear consideration as part of the package.

- ✓ Consideration the needed to strengthen IFRS 13, fair value measure-ments, guidance on substitution of ‘mark to model’ asset valuation. Substitution of ‘mark to model’ fair valuation of assets for sometimes distressed market values, because “MtM” assumptions are market is perfectly and market can absorb any amount of volume on either the buy side or the sell side without changing the price.

- ✓ Provision for a counter-cyclical adjustment just used on systemic consequences of exceptional volatility activated only when deemed necessary by EIOPA in currently unforeseeable circumstances, by the rest using matching premium.

VI Bibliography

Because the theme of this workpaper is not regulated in a formal document, and subject to its complete determination in the coming weeks, the main referencing documents for this research have been working papers provided by companies and workers anonymously and as internal presentations of the company where I work, Deloitte, besides anonymous consultation draft submitted to regulatory agencies and consulting studies, which failed to inform the author and / or exacting date.

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Appendix I

An actuarial perspective on the determination of the Solvency II matching adjustment

Summary

This paper proposes a matching adjustment as part of the Solvency II framework of the form (similar to that used for QIS 5):

MA_t = ($Spread_t$ – X) x K

Based on the analysis set out in this paper and in the supporting literature, we suggest that EIOPA might reasonably consult on an initial calibration of

MA_t = ($Spread_t$ – 35) x 0.7

Where the quantities are expressed in basis points and $Spread_t$ is a simple average of the observable spreads in respect of AAA/Aaa, AA/Aa, A and BBB/Baa bond assets.

A difference from QIS 5 which we believe justified on macro-prudential grounds is that the adjustment may from time to time be negative. We consider that the adjustment should apply in respect of insurer commitments which do not in practice provide policy-holders with valuable liquidation options.

Background

The purpose of this note is to illustrate how EIOPA might give effect to the recommendation on behalf of the actuarial profession that the Solvency II framework should include a 'matching adjustment' to the discount rate otherwise to be used in respect of 'matchable' commitments as follows:

> *EIOPA should, in accordance with long-established actuarial practice, determine the adjustment for each currency by reference to:*

- *The spread over risk-free on representative (duration-banded) portfolio(s) of investment grade assets of stipulated mix of credit quality and liquidity and denominated in that currency; less*

- *The expected annualised cost of adverse credit events in respect of similarly representative portfolio(s) based on representative historic data; less*

- *A risk margin reflecting the cost of capital required to meet potentially extreme adverse variations in adverse credit event experience in respect of the similar portfolio(s).*

It would be for EIOPA to consider whether the premium should in fact vary by duration – past research (Dick-Nielsen et al (2011)) indicates that it tends to increase very slowly with longer duration but the effect may not be material.

It should be noted that this is a controversial subject – there are substantial minorities of actuaries who believe either that a matching adjustment cannot be market-consistent or alternatively that such an adjustment should apply to most life insurer commitments. This paper is offered as an input to EIOPA development of consultation on calibration of an adjustment which balances considerations of policyholder protection with the traditional role of life assurance and pensions in mobilising funds for long-term investment.

The contents of the paper are as follows:

- Rationalefor a matching adjustment
- Desirable characteristics of a matching adjustment
- Conceptual algorithm for a matching adjustment
- Initial (and ongoing) calibration of the matching adjustment
- Scope of application of a matching adjustment
- SCR treatment of matching adjustment
- References (included with paper)

Rationale for a matching adjustment

Most of the actuarial profession strongly supports application, for solvency assessment purposes (of both (re)insurers and IORPs), of a 'matching adjustment' calculated in the manner described in the opening section above, to specific eligible liabilities (i.e. without explicit or implicit customer liquidation options of any value or otherwise deemed reliably predictable by EIOPA as to amount and timing). Our support is for three reasons:

- Allowance of an adjustment creates a clear economic incentive for insurers to minimise liquidity risk inherent in contracts mainly aimed at long-term security for customers;

- Allowance of an adjustment contributes to financial stability by reducing inappropriate insurer balance sheet volatility;

- Allowance of an adjustment sustains the unique role of (re)insurers and IORPs as efficient low-risk providers of long-term debt investment.

This latter rationale has been heightened in recent times as it has become clear that it is both theoretically undesirable and in practice impossible for the banking industry to sustain the maturity transformation risk inherent in provision of long term finance. Sustainable economic development depends on an economically rational context for insurers and pension funds to resume their traditional role as long-term investors in often illiquid assets.

Importantly, this paper considers the subject of a matching adjustment in relation to newly originating commitments only. We are fully aware of obvious difficulties in applying market consistency to historic long-term guarantees and we understand that these difficulties are a factor in persuading many of the rationale for a matching adjustment. However we believe it would be mistaken to derive the appropriate form of a matching adjustment from historic quantities (tail wagging the dog) – it is preferable to develop an appropriate adjustment for new commitments and deal with legacy issues by means of suitable transitional provisions.

Desirable characteristics of a matching adjustment

A. It should be continuously responsive to market conditions. Current market data should be a direct input to the calculation of the adjustment.

B. It should be predictable in the short and medium term, although necessarily flexible and less predictable in the long term.

C. It should be consistent across firms – the same commitment should attract the same quantitative provision independent of the specific context of the firm, including independence of the choice of assets by the particular firm.

D. It should incentivize judiciously prudent behaviours on the part of firms. This means incentivizing origination of liabilities which do not carry liquidity risk and avoiding incentivizing a lowering of asset quality.

E. It should be consistent with the Solvency II framework generally, including the conceptual framework underlying margins for non-hedgeable risk.

F. It should be as simple as practicable to calculate, and no simpler. A perfectly justifiable matching adjustment in financial economic terms is unobservable, and a demonstrably prudent approximation is entirely appropriate.

Conceptual algorithm for a matching adjustment

We note here that the recommendation set out in the opening section of this paper can plausibly be converted into a general algorithm similar to that which underlay the calculation of the 'illiquidity premium' as used in QIS 5 as follows:

MA_t = ($Spread_t$ – X) x K where

MA_t is the matching adjustment at a given time (t)

$Spread_t$ is an input reflecting a measure of the spread relative to the basic risk-free rate to be earned on a portfolio of quoted assets of stipulated quality, also at time (t)

X is a substantially fixed deduction from spread to cover:

- A floor level of expected defaults in respect of the same portfolio of quoted assets of stipulated quality; *plus*
- The cost of capital required to allow the firm to meet the worst case plausible one-year loss in respect of the same portfolio; *minus*
- An allowance for the yield increment available from partial investment in unquoted assets of consistent quality.

and K reflects the degree to which spreads are influenced by factors other than variation in the rate of prospective defaults.

We comment further on the logic of the various elements of this algorithm as follows:

Measure of portfolio spread

In order to achieve the desired objective of consistency across firms, this should be based on a representative portfolio of stipulated quality. The usual way of doing this is to define expected quality in terms of weights to be associated with the proportions of assets of stipulated credit quality. A minimum level of quality is appropriate also. Thus the spread input could be defined as:

$Spread_t$	=	a	x	$Spread_t$(assets – credit quality step 1)
		+b	x	$Spread_t$(assets – credit quality step 2)
		+c	x	$Spread_t$(assets – credit quality step 3)

etc. where the total of the weights (a, b, c, …) adds up to 100%.

Floor level of expected defaults

The concept of the algorithm, supported by the research literature, is that prospective defaults (including adverse migration) in respect of the representative portfolio are the sum of both a long-run floor expectation and a proportion linked to the current level of spreads. This long-run expectation would plausibly be determined having regard to historic data.

Worst case loss event

The algorithm assumes, consistently with the Solvency II framework generally, that the matching adjustment should be net of the cost of capital required to be maintained to cover a plausible worst case one-year loss in respect of the representative portfolio. This requires consideration of historic data in respect of default and adverse migration frequencies together with data in respect of rates of recovery. The references include the best data of which we are aware, although we agree with the caveat that the data is highly non-stationary. We also believe that data beyond one year needs to be considered.

Cost of capital

The algorithm requires an assumption to be made in respect of the cost of capital. In practice it seems likely that the cost of capital in respect of non-hedgeable credit risk is

likely to be quite volatile because of the systemic dimension. Nevertheless insofar as cost of capital is an element of the calculation of a matching adjustment to be applied to provisions in respect of long-term commitments, a long run average cost of capital may justifiably be used.

Yield increment from unquoted investment

The matching adjustment is a measure of the additional yield which may safely be earned on illiquid assets of good quality, both quoted and unquoted. Insofar as the input spreads are derived by reference to markets for quoted assets it is appropriate to make judicious allowance for the additional yield which Andrews (2011) shows may be earned on partial investment in unquoted assets.

Linkage of spreads to prospective defaults and other factors

The algorithm requires distinction between the degree to which spreads at any given time are a function of expected future defaults and of other influences. This distinction can be drawn only approximately, but it appears that there is a growing consensus that spreads are influenced principally by considerations other than prospective defaults (Giesecke et al (2011) and Barone-Adesi et al (2012)).

Giesecke is worth quoting here:

> *We find that stock market returns and changes in stock market volatility have significant predictive power for default rates. These results are very consistent with the implications of current financial theory.We also find that changes in gross domestic product(GDP) forecast default rates in the direction expected. On the other hand, other macroeconomic variables such as inflation and the growth rates of consumption and industrial production do not forecast future default rates. Surprisingly, credit spreads do not appear to have much predictive power for subsequent default rates.*
>
> *These counterintuitive results support the view that corporate credit spreads are driven significantly by financial market factors such as illiquidity and risk premia, rather than by fundamentals, consistent with Collin-Dufresne, Goldstein, and Martin (2001), Elton, Gruber, Agrawal, and Mann (2001), Longstaff, Mithal, and Neis (2005), and others.*

Initial (and ongoing) calibration of the matching adjustment

Having outlined the underlying concepts, we turn to illustrating how the algorithm might initially be calibrated. Consistent with the objective of medium-term predictability, we advocate annual review of calibration but in the expectation that material change should be much less frequent than annually unless market conditions have altered in dramatic and unexpected fashion. We therefore encourage EIOPA to consult actively on the initial calibration, and have offered thoughts of our own below as a basis for discussion.

It is relevant to the calibration that we envisage that the calibration may give rise to a negative adjustment from time to time. This is likely to be the case only in circumstances of high market liquidity associated with probable under-estimation of credit risk. Thus if the algorithm gives rise to an extended period of negative results, this should be interpreted as prima facie evidence to justify adjustment of certain parameters.

Measure of portfolio spread

We consider it important to form a prudent view of this measure, while retaining plausible realism. We consider that an equal weighting across all four investment grade rating classes is plausible i.e. 25% each in AAA/Aaa, AA/Aa, A and BBB/Baa.

Floor level of expected defaults

We looked at Moody's analysis of default rates over the period 1920-2020 which showed 20-year cumulative default rates by rating as follows (percent):

Aaa	1.698
Aa	5.416
A	7.139
Baa	13.275

We calculate that this translates into an average default rate for the representative portfolio of 38 bps and combining this with a recovery rate of about 50% suggests an average cost of default of approximately 20bps. We suggest this be rounded up to 25bps.

Worst case loss event

This is perhaps inevitably the most subjective element of the calibration. Giesecke et al (2011) provides the longest historical perspective of which we are aware and explains the non-stationarity of the data as follows:

> *The time series of default rates shows that there is wide variation in the historical experience. The first half of the study period is characterized by a series of severe and prolonged credit episodes. In contrast, the second half of the study period experienced far fewer major credit events. This pattern parallels the well-known evidence that, from 1857 (when the NBER data begin) to today, business cycles have generally become more infrequent and less severe.*

The data from Varotto (2011) is perhaps more useful in that is subdivided by rating status and can therefore be applied directly to the chosen representative portfolio. Varotto raises further issues to be considered however:

> *When deriving adequate capital levels, we find that two critical factors are the holding period assumption and migration risk. The holding period in current and proposed regulation, and in popular credit risk models used in the industry, is set at one year. This implies that, in a crisis, banks would be able to stop losses or recapitalize within that time frame. Empirical evidence, however, suggests that this may be too optimistic. We show that stretching the holding period to 3 years may cause losses, and hence the capital needed to absorb them, to go up by three times. If migration risk is also included in the analysis, losses may rise further by a smaller but still significant amount.*

Although Solvency II has its roots in a concept of a one-year value at risk (VAR) this does not necessarily mean that the worst case event should be based only on data corresponding to a one-year holding period. Subject to consultation with stakeholders, and in the context of the purposes of the matching adjustment, we believe that the data corresponding with longer holding periods are the more relevant. We also prefer to substitute an assumed 40% recovery rate for the 50% used in Table 4 of Varotto.

Applying the adjusted factors from Table 4 of Varotto to the representative portfolio suggests a worst case capital requirement of 2.44% of the value of the portfolio. We round this up to 2.5%. We note that this figure is very sensitive to the assumed composition of the representative portfolio.

Cost of capital

The long run estimated cost of capital in respect of non-hedgeable risks generally has been established at 6% per annum. We noted above that credit risk has a systemic element which makes for a more volatile cost of capital, but 6% per annum seems a justifiable medium/long run estimate.

Yield increment from unquoted investment

Although not materially bearing on the outcome, we regard this as an essential element of the calibration formula. Based on the Andrews (2011) study of North American private placement data, we deduce:

- The addition to yield from investment in unquoted securities varies by credit rating and also according to market liquidity circumstances;

- The addition to yield in respect of securities rated A or better prior to 2007 was of negligible importance.

A plausible representative portfolio might be up to 50% unquoted instruments and securities. We suggest that an allowance of 5bps on the total portfolio is a prudently-biassed but plausible assessment of the incremental yield to be earned from such investment.

Linkage of spreads to prospective defaults and other factors

As already noted, there is a growing consensus that changes in credit spreads are influenced primarily by factors other than changes in prospective defaults. We are also aware of an actuarial consensus as at 31 December 2008 that only some 25% of spreads could plausibly be attributed to expected default.

We think it plausible that an appropriate initial calibration for K is approximately 0.7 although we recommend analysis and consultation in relation to a range of 0.6 to 0.8. We suggest that the consultation should illustrate K= 0.6, 0.7 and 0.8.

Scope of application of a matching adjustment

This is probably the area of greatest controversy in relation to any proposed matching adjustment, including how to take account of liquidation options available to the ultimate customer.

The orthodox financial economic position is set out clearly in the actuarial literature by Babbel, Gold and Merrill (2001) as follows:

> *"For instance, it is argued that insurance liabilities are generally illiquid and long term in nature, and that this affords insurers the opportunity to invest in illiquid and/or longer- term securities, thereby capturing any available liquidity and/or term premium. Accordingly, advocates of this line of reasoning endorse the inclusion of a positive liquidity premium in the valuation of insurance liabilities.*

The effect of incorporating such a premium into the discount factor applied to the liabilities is to reduce their reported fair value.

We take issue with this line of reasoning. First, it is not the long-term or illiquid nature of insurance liabilities that allows insurers a comparative advantage at bearing liquidity risk. It is predictability of cash flows that allows a firm to take liquidity risk. To the extent that there are option-like features in the insurance liabilities, the insurer may get burned trying to take excessive liquidity risk in its assets."

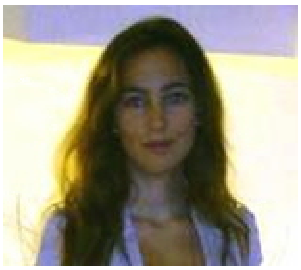
This would tend to lead to limitation of the matching adjustment only to provisions where no cash liquidation option was available to the policyholder or beneficiary. However this may not be the whole story, in that policyholders or beneficiaries may in theory have cash liquidation options which do not have value in practice – for example if liquidation involves some form of fiscal penalty.

It may therefore be that the matching adjustment should be allowed in whole or in part for provisions where it can be plausibly shown by the undertaking that policyholder behaviour has not been in the past, and is not likely to be in the future, sensitive to market liquidity conditions. It may be that there can be a role for the actuarial function in such an analysis.

SCR treatment of matching adjustment

Because the matching adjustment is in effect an offset to variation in credit spreads, it is important that it be treated consistently with the treatment of spread variation in the SCR standard formula. The most straightforward way to do this seems likely to be to apply to homogeneous risk groups attracting a matching adjustment in whole or in part an integrated stress reflecting both variation in bond spreads and the consequent variation in the matching adjustment.

Curriculum Vitae



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Economic and Financial Management for Insurers and Financial Undertakings
2011-2012 Barcelona University (**UB**)

Financial Markets
2009-2010 Barcelona School of Management (**IdEC-UPF**)

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Business & Administration
2005-2009 Barcelona University (**UB**)
Enterprise-University-SocietyProgram (**EUS**'07-09)
ERASMUS: School of Business, Economics and Law,Göteborg (**Sweden**'07-08)

EMPLOYMENT HISTORY

Experience Senior at Deloitte *Today - 2008*
Financial Services Industry

- Participation and project coordination -1/12 months duration- & team management and leadership -until 5/6 persons-
- Risk Banking Financial Advisory, consulting in the establishment of a new department on Internal Control and implementation SCIIF (Financial Information Internal System Control) - SOX framework-
- Audit on financial industry: Analysis of Annual Accounts of Insurers, Capital Risk, Funds, etc. (aprox 7.000 millions of turnover)
- Capital Risk Valuation Firms
- Identify and analyze key financial risk on internal business proceedings; monitoring and assessment of design and implementation of associated controls
- Teaching new jobmates on Financial Accountancy (130h)
- Executive prsentations and speeches

Previously,
Administration at BBVA Bank *2007 – 2006*
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