



Lisbon School  
of Economics  
& Management  
Universidade de Lisboa

**MASTER  
ACTUARIAL SCIENCE**

**MASTER'S FINAL WORK  
INTERNSHIP REPORT**

**ANALYSIS OF SHOCKS AFTER THE  
IMPLEMENTATION OF IFRS 17**

**LIZBETH STEFANY ZAVALA CUICAPUZA**

**OCTOBER - 2022**



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**SUPERVISION:**

HUGO BORGINHO

BRUNO ALFAIATE

**OCTOBER - 2022**

*To my family, for their big effort  
and support to pursue my dreams.*

*A special mention to my father,  
who saw in person the beginning  
of this journey, and he is seeing its  
end from the sky.*

## GLOSSARY

BEL – Best Estimate Liability

BBA – Building Block Approach

BS – Balance Sheet Statement

CSM – Contractual Service Margin

CU – Coverage Units

IASB - International Accounting Standards Board

IFRS - International Financial Reporting Standards

FCF – Fulfilment Cash flows

GMM – General Measurement Model

LIC – Liability for Incurred Claims

LRC – Liability for Remaining Coverage

LC – Loss Component

OCI – Other Comprehensive Income

PAA – Premium Allocation Approach

PPR – Plano Poupança Reforma

P&L – Profit and Lost Statement

RA – Risk Adjustment

VFA – Variable Fee Approach

UL – Unit Linked



## ABSTRACT AND KEYWORDS

IFRS 17 is the new accounting standard that will be effective starting from 1<sup>st</sup> January 2023. After the publication of the standard, entities such as insurance companies, consultants and regulators have shown their concern regarding its implementation due to their complexity and how it will impact the preparation of disclosures and Financial Statements. But the worries not only lie on their application, also in their subsequently measurement and how future unexpected events will change the Financial Statements.

The present internship report addresses the problem regarding the future shocks that the entities may face after implementing IFRS 17 and it is focused on onerous contracts on the life business. For its analysis, a sample of three products, PPR, Unit Linked and Whole Life Insurance were taken. The data was taken from one of the biggest Portuguese insurance companies. Considering it, three shocks have been assessed, increment in premiums, increment in mortality and increment in the interest rate.

From the practical cases studied, it is possible to have as conclusion that the increment in premiums will change the Equity and Assets, the increment in mortality and interest rate will change the Equity and Liability sides, and the severity of the effects will depend on the particular characteristics of each product, which will be analysed and explained in a detailed way through the chapters of the present internship report.

**KEYWORDS:** IFRS 17, Premiums, Mortality, Interest Rate, Onerous Contracts, Loss Component.

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## 1. INTRODUCTION

The insurance market requires a regulation on the accounting perspective and a proper way of presenting the Financial Statements of insurance undertakings, due to the fact that their complexity measuring the risk and the value of claims, the long-term vision and the particular way of identifying their incomes are different from any other sector.

IFRS 4 have been the international standard for the insurance market, but in May 2017, the International Accounting Standards Board (IASB) issued *IFRS 17 Insurance Contracts*, followed by *Amendments to IFRS17* in June 2020. With this final document, IFRS17 will need to be effectively implemented in January 2023.

The new standard mainly establishes, among other aspects, principles for the measurement and recognition for the insurance contracts that entities need to allocate in their Financial Statements in order to reflect their obligations in a proper and internationally consistent way, although its complexity, it will give updated information about the insurance contracts and will improve the information about the profitability and the benefits that are expected from the insurance contracts. Through the new standard, it is going to be possible to have more information about the financial information regarding the current and future profitability of the insurance contracts, and also the revenues that the entity is expecting to have.

Although, IFRS17's implementation implies a big transformation in finance, in data, systems and reports, the complexity does not stop there; subsequently, the entities will face new challenges in terms of changes in financial and non-financial assumptions and how they will impact the BS and PL, whose analysis is the objective of the present internship report.

The internship report is the result of a work of three-months in "Deloitte Risk Advisory, S.A." in the Lisbon office. Throughout the internship, I was involved in a project in which our role as a team is to give support in the implementation of IFRS17 in a Portuguese insurance company. Part of the project was assessing, analysing and interpreting the results of three main changes (scenarios) which can occur along the duration of the contract (after inception). My team and I considered it an interesting subject and it has been chosen as the main topic of my internship report.

In order to understand better the main effects of the three scenarios, it is necessary first to understand the basic concepts considered under IFRS 17, and for it, it was taken as main reference the document "*IFRS 17 Insurance Contracts*", the illustrative examples in

“*Illustrative examples on IFRS 17 Insurance Contracts*” and internal documents presented by Deloitte in workshops. Thus, Chapter 2 describes the main concepts undergoing IFRS17, gives a description of it focusing on the topic of the present internship report including the dynamics and movements in the Balance Sheet Statement and P&L.

Given the complexity in the explanation of the topic, a separation was made on the case under study in Chapters 3 and 4. Chapter 3, mainly explains the particular characteristics of the three products of the insurance company that will be used as example for the analysis of the shocks, it also explains the position of each product in the baseline scenario which will be the reference for the shocks that are going to be explained in Chapter 4.

The detailed description of the shocks in each insurance product will be analysed in Chapter 4, showing its impact in the Income Statement and in the Liability side.

Chapter 5 shows the overall conclusions after the analysis of the shocks under IFRS17 that has been presenting during the present report.

## 2. CONCEPTS AND GENERAL OVERVIEW OF IFRS 17

### 2.1. *Important Concepts*

#### **Best Estimate Liability**

The Best Estimate Liability (BEL) is not explicitly defined in IFRS 17 but is commonly used to refer to the present value of the probability-weighted estimate of future cash flows.

#### **Building Block Approach**

The Building Block Approach (BBA) or General Measurement Model (GMM) is the default valuation model in which the insurance contracts are valued considering the Fulfilment Cash Flows (that contains the BEL added with the Risk Adjustment) and, if it is applicable, the CSM.

#### **Contractual Service Margin**

The Contractual Service Margin (CSM) represents the unearned profit that the entity is going to recognize at each reporting period during the duration of the contract.

#### **Coverage Units**

The Coverage Units (CU) is the measure used to determine the base for the appropriate recognition of the Contractual Service Margin during the duration of the contract.

#### **Insurance Contract**

An insurance contract is an agreement in which there is two parties, the insurer is the one that accepts the significant insurance risk and the policyholder that is the other side that receives a compensation in case of a specific uncertain future insured event.

#### **Fulfilment Cash flows**

The Fulfilment Cash Flows (FCF) is the present value of the probability-weighted of the cash inflows and outflows plus the Risk Adjustment.

#### **Liability for Incurred Claims**

The Liability for Incurred Claims (LIC) measures the Fulfilment Cash Flows related to past services allocated to the group at that date.

#### **Liability for Remaining Coverage**

The Liability for Remaining Coverage (LRC) comprises the Fulfilment Cash Flows related to future services and the CSM of the group at that date.

### **Loss Component**

The Loss Component (LC) is a characteristic of an onerous contract that represents the portion of the loss that has not been recognized in the P&L yet.

### **Onerous Contracts**

According to IFRS 17, an insurance contract is named onerous if at the date of initial recognition, the cost for meeting obligations exceeds the economic benefits expected to be received under it.

### **Premiums Allocation Approach**

The Premiums Allocation Approach (PAA) is an optional and simplified methodology to value contracts with a maximum coverage period of one year.

### **Risk Adjustment for non-financial Risk**

The Risk Adjustment (RA) corresponds to the compensation expected by the entity to face the uncertainty about the amount and timing of future cash flows related with non-financial risks.

### **Variable Fee Approach**

The Variable Fee Approach (VFA) is a particular valuation methodology of insurance contracts with direct participation features.



## 2.2. General Overview

IFRS 17 is the international accounting standard for reporting accounting that will replace IFRS 4 for insurance contracts starting from January 2023, it has been issued in May 2017, with amendments in June 2020, and with a transitional period of one year, starting from January 2022:



Source: Author's, based on IASB

Figure 1 – Timeline of IFRS 17 Implementation

It is necessary to mention that the International Accounting Standards Board (IASB) have decided to change the standard reporting, mainly, since the information provided under IFRS 4 is not sufficient and not comparable between companies of different countries.

IFRS 17 is applicable to insurance contracts, reinsurance ceded contracts and investment contracts with discretionary participation features. On the other hand, since each contract is complex and may have different components (such as derivatives, investment components and non-insurance services), the Standard requires to identify and separate their components, then after separating non-insurance components<sup>1</sup>, the Standard is applied to all remaining components with significant insurance risk.

In order to determine whether the insurance risk is significant, the company should calculate on a present value basis, for any scenario that has commercial substance, the amounts to be paid if an event related with the insurance risk occurs and the amounts if that event does not occur and assess whether those amounts significantly differ. To evaluate the relevance of the difference, it is necessary to define a threshold; there is not specific requirement about how

<sup>1</sup> The Standard allows to consider products with just investment components to companies that have other eligible products with significant insurance risk.

the threshold should be calculated, since, according to IASB, if it is stated a specific requirement for it, it would create an arbitrary accounting opportunity.

After identifying the pool of contracts with significant insurance risk, the entities need to consider 3 levels of aggregation of the contracts: type of contract, profitability level and cohort. In this way, at the time of initial recognition, it is necessary to allocate the applications of eligible contracts to groups of it:

-Level 1: Type of contract

The first level of aggregation is characterized by contracts subject to the same risks that need to be managed together.

-Level 2: Profitability

After aggregating contracts into the type of contract, based on risk and management criteria, the Standard provides for a second aggregation level, through the allocation of contracts by buckets of profitability. In this sense, the aggregation of contracts will be in one of 3 groups: contracts that are onerous at initial recognition, contracts with reduced probability of becoming onerous and remaining contracts.

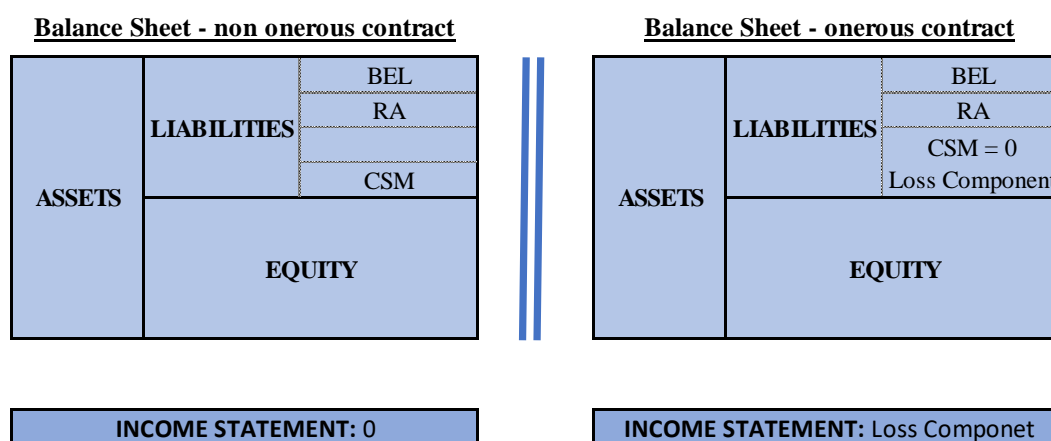
-Level 3: Cohorts

The level 3 of aggregation consists of allocating the contracts of the groups established in the aggregation of level 2, based on the respective date of issue. In each contract group (cohort) there cannot be contracts whose date of issue represents a difference of more than 12 months. It is necessary to mention that the groups are categorized at initial recognition and there is not possibility of reassessment.

The Standard has defined three concepts to measure the liabilities. The Best Estimate Liability (BEL) which represents a proxy of the amount that an entity needs to pay as liabilities as they fall due. The second component is Risk Adjustment (RA), it reflects the compensation that a company needs to bear uncertainty in timing and amount related to non-financial risks. The third liability item is the Contractual Service Margin (CSM), it represents the future profit margin that arise from insurance contracts. For non-onerous contracts, the CSM it is the amount that results in no impact on income/expenses at initial recognition.

IFRS 17 establishes 3 different measurement models, which depends on the characteristics of the contract, in order to define the way that the assets and liabilities of the insurance contracts should be recognized and measured over time.

The first method is the General Measurement Model (GMM) or Building Block Approach (BBA). Based on this valuation model at inception, the company calculates the expected discounted cash flows, RA and the remaining is called contractual service margin (CSM) or Loss Component (LC) in case the contract is onerous:



Source: Author's, based on IASB

Figure 2 – Balance Sheet in an onerous and non-onerous contract

Then, if there is an expected LC, it should be allocated in the Income Statement as an Insurance Service Expenses at initial recognition, and, afterwards, as an Insurance Service Income. Every period the company can update its previous assumptions and consequently the amounts for the expected cash flows, risk adjustment, CSM and LC may change; those changes can go through CSM, Insurance Service Expense or can hit the OCI directly.

In case of a non-onerous contract, once the company delivered the insurance service then part of the CSM will be recognized as gain in the Income Statement. On the other side, in case of an onerous contract, every period will be a releasing of the LC that was recognized at inception, that amortization will be allocated as a gain on the Insurance Service Income (a detailed explanation of the dynamics will be presented in the next section).

The second measurement method is the Variable Fee Approach (VFA), which is just applicable for insurance contracts with direct participation features, in this group of insurance contracts the insurer promises a return based on a set of underlying items. A group of insurance contracts must fill the following characteristics at inception to apply the VFA method:

- The policy holder must participate in a clearly identifiable pool of underlying items.
- The insurer expects to pay out an amount equating to a share in the return on the underlying items.
- Any amounts payable to the policy holder will vary with changes in the fair value of the underlying items.

The way how it works is similar to the general measurement model, the main difference is that the fee earned from the investment activity is considered in the measurement of the contract.

The third measurement method is the Premium Allocation Approach (PAA), which is a simplification of the GMM that may be used by the company if at inception the group of insurance products meets the following characteristics:

- There is not a significant material difference in the results between the application of the PAA and GMM to the group of contracts.
- The coverage period of the group of products is maximum of one year.

Under the PAA approach the company to do not project future Cash flows for the Liabilities for Remaining Coverage (LRC), the liabilities for remaining coverage are calculated as the premiums unearned less the premiums received.

The recognition of the CSM or LC in the Profit and Loss (P&L) needs to be made considering the coverage units, which are defined as a proxy for benefits provided, it means that it should reflect the different types of benefit provided in the group of contracts. Assuming that the report is made at the time t, the recognition of CSM or LC will be the part of the coverage units recognized during the period t multiplied by the CSM or LC at the end of the period (before the recognition of the CSM or LC):

$$\text{Recognition of } CSM_t = \text{Factor\_Coverage Units}_t \times CSM^* \quad (1)$$

$$\text{Factor\_Coverage Units}_t = \frac{CU_t}{CU_t + CU_{projected}} \quad (2)$$

Where:

*Recognition of CSM<sub>t</sub>*: Amount of CSM recognized in the period t.

*Factor\_Coverage Units<sub>t</sub>*: Portion of the total coverage units recognized in the period t.

*CSM\**: Amount of the CSM at the end of the period t-1 after considering the interest that the CSM gained and any possible change in the amount of CSM.

*CU<sub>t</sub>*: Coverage Units of the period t.

*CU<sub>projected</sub>*: Coverage Units projected.

The amortization of the LC follows the same logic.

### 2.3 Mechanisms and Dynamics in the Balance Sheet Statement and P&L

It has been defined in the previous section that according to the GMM, the Liability is separated in three parts (BEL, RA and CSM, including a Loss Component when it exists), but also IFRS 17 states that the liabilities should be divided between Liabilities for Remaining Coverage (LRC) and Liabilities for Incurred Claims (LIC), each one will consider the Fulfilment Cash Flows. The difference between LRC and LIC is that for the LRC the Fulfilment Cash Flows are related to future services and for the LIC is related to past events. On the other hand, the CSM is only considered in the LRC:

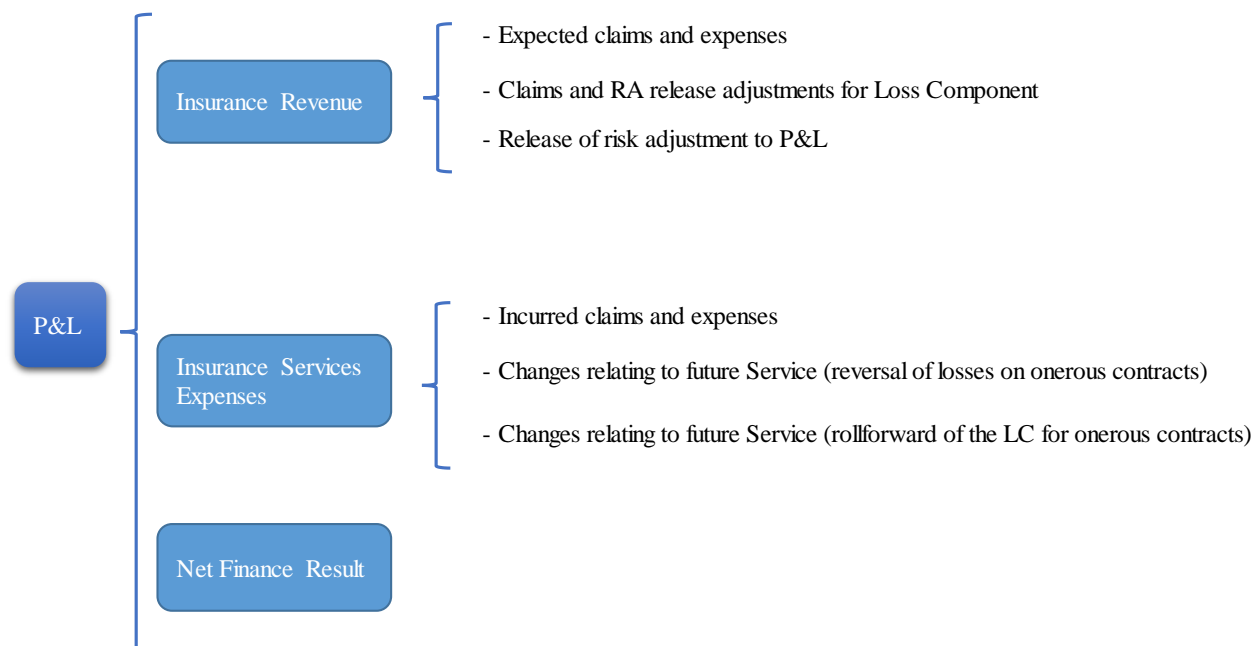
LIABILITY			
Liabilities for Remaining Coverage		Liabilities for Incurred Claims	
FCF (related to future services)	{ BEL RA	FCF (related to past services)	{ BEL RA
CSM			

Source: IFRS 17

Table 1 - LRC and LIC

In terms of the internship report, the analysis will focus on the LRC of the chosen products.

Regarding the P&L, the main lines that will be considered for the analysis of the insurance contracts are structured in the following way (notice that there are not changes related to past service since the products analysed do not have liabilities for incurred claims):



Source: IFRS 17

Figure 3- Components of the P&L

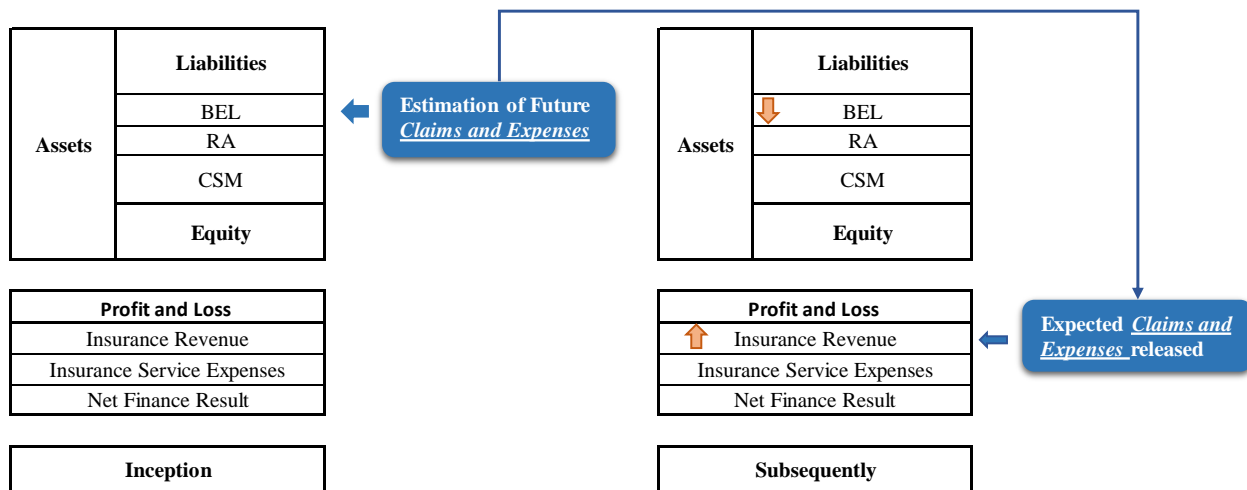
For a better understanding of the following charts, it is important to highlight how the Total Income Statement will be calculated:

$$\text{Total Income Statement} = \text{Insurance Revenue} - \text{Insurance Services Expenses} + \text{Net Finance Result} \quad (3)$$

Notice that the Insurance Service Expenses has a positive value that will decrease the Insurance Revenue.

### 2.3.1 Claims and Expenses

At inception, all the estimation of the future claims and expenses are allocated as BEL in the liability side. Subsequently, according to IFRS 17, the release of those estimated values will be allocated as an increment in the Insurance Revenue:



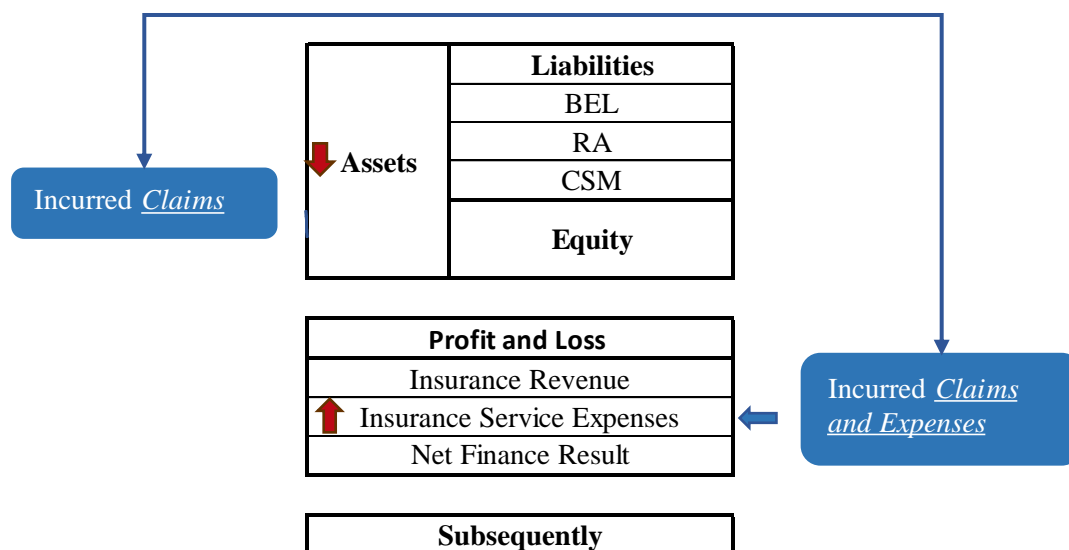
Source: IFRS 17

Figure 4 - Expected Claims and Expenses at Inception and Subsequently

On the other hand, the expected values calculated at inception will not necessarily be the real values of the claims and expenses that in fact the insurance company paid:

Expected <i>Claims and Expenses</i>	≠	Real <i>Claims and Expenses</i>
-------------------------------------	---	---------------------------------

The Real Claims and Expenses (will be called “actuals” in the present internship report), will be allocated in the Insurance Service Expenses and the counterparty of it will be a change in the Assets (it could be a decrease or increase, it depends if the actuals are higher or lower than the expected):



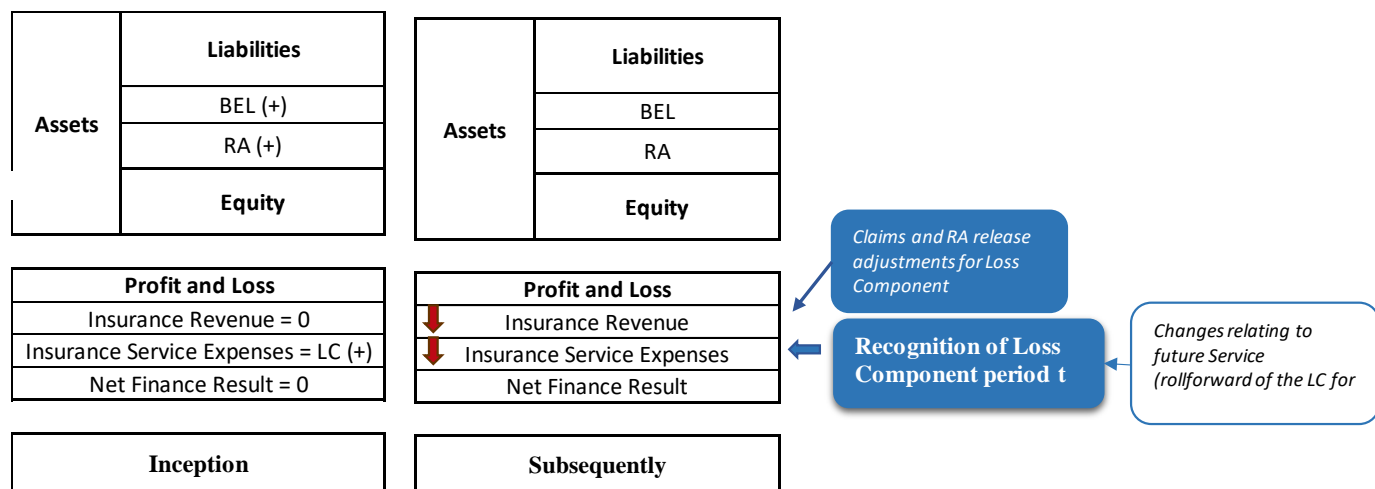
Source: IFRS 17

Figure 5 – Recognition of Incurred Claims and Expenses Subsequently, example when the actuals of incurred claims and expenses are higher than the estimated

### 2.3.2 Loss Component

When a contract is onerous (case discussed in this internship report), a Loss Component is recognized at inception in the Insurance Service Expenses, then, IFRS 17 establishes that every period will be an amortization of that amount and when it happens the Service Expense will be affected by the respective amortization of the Loss Component during that period, that amount will be allocated in the Insurance Service Expenses as “Changes relating to future Service (roll forward of the LC for onerous contracts)”. On the other side, the counterpart of it will be a decrease in the Insurance Revenue allocated as “Claims and RA release adjustments for Loss Component”:



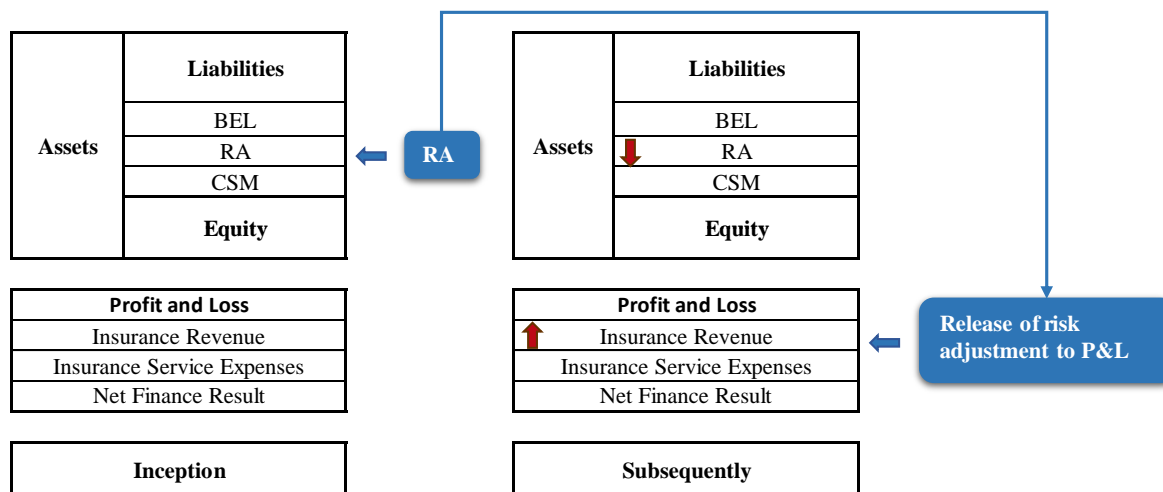


Source: IFRS 17

Figure 6: Subsequently recognition of Loss Component

### 2.3.3 Risk Adjustment

At inception, the Risk Adjustment is allocated in the liability side, then every period it will be released, the release will be considered Insurance Revenue:

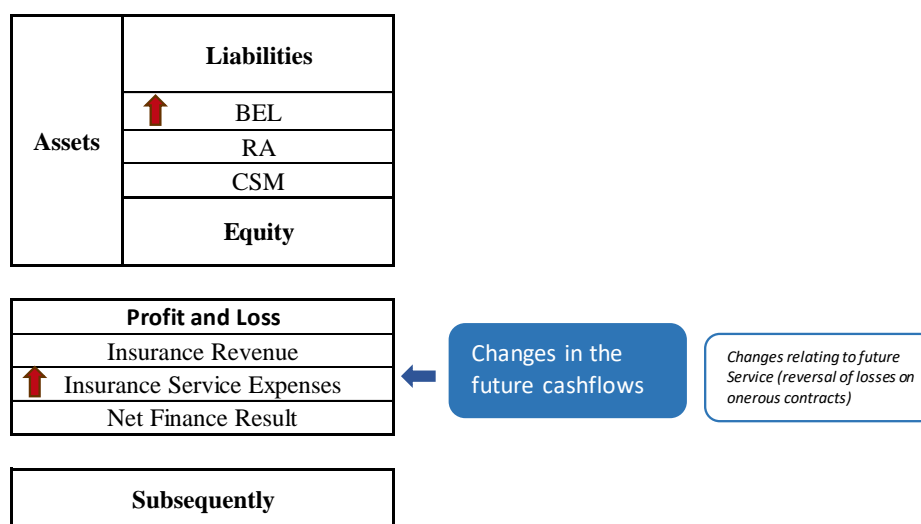


Source: IFRS 17

Figure 7 - Recognition of Risk Adjustment at Inception and Subsequently

### 2.3.4 Changes related to updated assumptions

Subsequently, in case that the entity determinates that the assumptions for the estimation of future Cash flows need to be updated, according to IFRS 17, the entity should recognize those changes in the P&L, specifically in the Insurance Services Expenses, and will be allocated under the name “Changes relating to future Service (reversal of losses on onerous contracts)”. The change will be considered as an increment in case that the contract become more onerous or as a decrease in case that it will become less onerous (the following graph considers the case when the contract become more onerous):



Source: IFRS 17

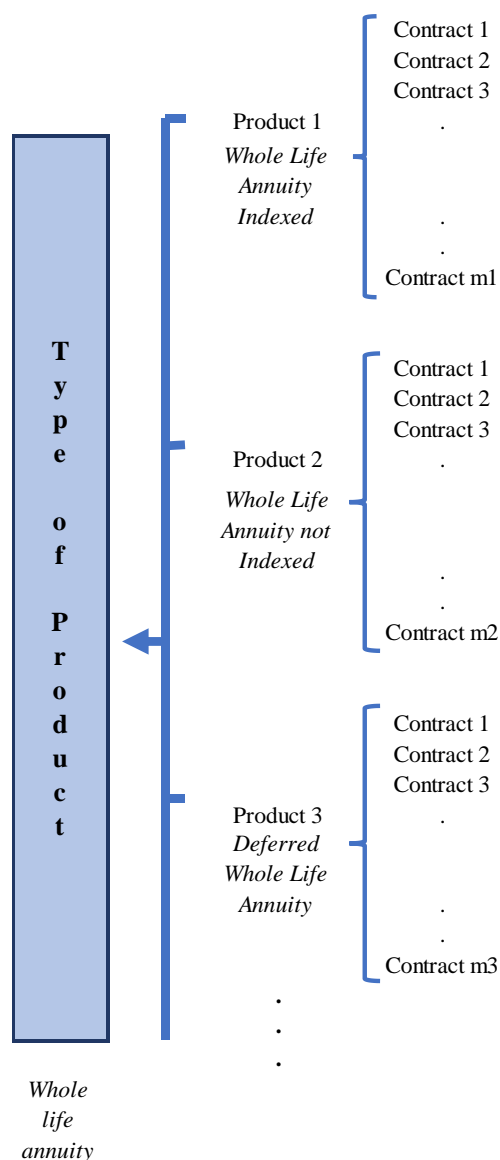
Figure 8 - Subsequently recognition of changes in the future cashflows

Changes due to revision in estimates for the calculation of the RA follows the same procedure.

### 3. IMPLEMENTATION AND BASE SCENARIO

#### 3.1 Segmentation of contracts

IFRS 17 states that insurance contracts should be aggregated to form portfolios of contracts subject to similar risks and managed together. An insurance contract is a document which represents the agreement with the specific conditions between the insurance company and the policyholder. One can consider a product as a higher level, i.e. a portfolio that has many contracts subject to similar risks. In the following graph is possible to see the relation between a product and a contract, and also it shows a particular example of the type of product “Whole life annuity”:



Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Figure 9 - Type of product and contracts

Since the contracts follow the characteristics of the product, it has been decided to carry out the assessment of whether the contracts belong or not to the scope of IFRS 17 at the level of each product.

Four criteria have been defined to analyse if a product is considered under IFRS 17 framework:

- Product with significant insurance risk component.
- Mixed or investment product with life risk component.
- Product with discretionary participation.
- Reinsurance treaty ceded.

The next step after analysing the eligibility of the products is evaluate the need of separation between insurance and investment components (unbundling). The products under analysis are not applicable for unbundling as the policyholder cannot benefit from the investment component without the insurance component, and vice versa [IFRS 17 Appendix B32b].

About the significance of the insurance risk, two scenarios were analysed, one assuming the materialization of the insurance risk and another assuming the no materialization of the insurance risk, then it is required to analyse if the scenarios have commercial substance or not, in the case that they have it, is necessary to calculate the present value of the outflows for each scenario and calculate the following ratio:

$$ratio = \frac{\sum PV_{Outflows}(scenario A) - \sum PV_{Outflows}(scenario B)}{PV_{Outflows}(scenario B)} \quad (4)$$

Where:

*scenario A*: The claim event occurs.

*scenario B*: The claim event does not occur.

To check whether the difference between scenario A and scenario B is significant, it has been defined a threshold:

<b>There is no significant insurance risk</b>	<b>There is significant insurance risk</b>
<b><i>Ratio ≤ Threshold</i></b>	<b><i>Ratio &gt; Threshold</i></b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 2 – Threshold for significant and no significant insurance risk

The threshold was defined by the insurance company since the Standard allows the entities to apply their own judgement to determinate it, considering that, the entities in the market have adopted thresholds in the range of 2% and 5%. It has been identified 195 products of the direct insurance portfolio which are under the scope of IFRS 17, from them 112 and 83 are investment and life risk products respectively.

After identifying the universe of contracts eligible for IFRS 17, what comes next is organizing the insurance products in order to see to which group each one belongs, according to the three levels of aggregation that were mentioned in Section 2.

In the present internship report is going to be analysed a sample of 3 types of products, which are assumed onerous.

### *3.2 Products analysed*

#### *3.2.1 PPR*

PPR is a long-term investment product that allows to the policyholder to make savings until their retirement age. Its objective is complementing the future pensions that the policyholder will receive when they become retired. There are many different ways how this product can be structured and fit to the needs of the clients, for example, for someone who has high risk aversion there are PPR in which the profitability is low, but the capital is guaranteed, on the other side, for someone who is willing to take higher risks, there are PPR where the profitability is high but the policyholder has the risk of losing their capital

The specific PPR type of product that will be analysed in the internship report has fixed amount of regular payments (premiums) stablished at the beginning of the contract that the client agreed to make to the insurance company until their retirement age. At the retirement age the insurance company will start paying to the policyholder for a fixed period of time (also

established at the beginning of the contract) or until the event of death of the policyholder, depending on the event that occurs first, the insurance company will pay benefits to their beneficiaries.

On the other side, there is not possibility to do any additional premium payment apart from the ones fixed at the beginning of the contract. Regarding the guarantees, it is guaranteed to the client the capital and their respective profitability that it will gain. The policyholder also will have the right to participate on the profits with a percentage of 90%. This type of product also has discretionary participation features.

### *3.2.2 Open Unit Linked*

Unit Linked products are financial products that have both, life insurance and a savings fund. The policyholder decides where to invest their assets (funds, stocks or bonds) while the insurance company keeps the ownership of those assets. Keeping this in mind, part of the payments that are made by the insurer covers the insurance risk, but most of the capital is invested in a portfolio of assets and the risk is assumed by the policyholder. From the perspective of the policyholder, the risk is higher than in a PPR product, since its ability to produce income is directly and exclusively dependent on the behaviour of the assets where the funds were invested. There is no guarantee of profitability or of recovering the capital invested. On the other side, a Unit Linked product can be of two types:

- Closed: When it allows only one single premiums at the beginning of the contract.
- Open: When periodic or reinforcements of premiums are allowed.

The specific Unit Linked type of product that will be analysed in the internship report is open, it has a single premium at the beginning of the contract, but it allows premium reinforcements. Regarding the insurance side, it does not cover natural deaths, it just considers accidental causes. This type of product does not have discretionary participation feature.

### *3.2.3 Whole Life Annuity*

A Whole Life Annuity is a type of product in which the insurance company will make regular payments to the policyholder while is alive in exchange of a single premium. In case of death of the policyholder, the insurance company will pay benefits to the beneficiaries. A specific characteristic of this type of product that will be analysed in the internship report is

that the policyholder will have the right to participate in 85% of the profits at the end of each year. This type of product has discretionary participation feature.

The following chart is a summary of the main characteristics of the type of products described above:

Type of Product	Risk Component	Participation of benefits	Discretionary Participation	Valorization Method
PPR	Yes	Yes	Yes	GMM
Opened Unit Link	Yes	No	No	GMM
Whole Life Annuity	Yes	Yes	Yes	GMM

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 3 – Characteristics of the products under analysis

### *3.3 Inputs and Assumptions*

In order to quantify the impacts under the IFRS 17 and considering the scenarios that could affect more the Financial Statements, it has been defined 3 scenarios of changes made over the position reflected in Scenario 0:

Scenario 0: Base Scenario

Scenario 1: Increment in premiums (40%).

Scenario 2: Increment in mortality (20%).

Scenario 3: Increment in the curve of interest (20%).

In the practical case, it will use anonymised data provided by a Portuguese insurance company and we will analyse the results after changes on the premiums (Scenario 1), increment in mortality (Scenario 2) and increment in the interest rate (Scenario 3). On the other side, it will be a subsequent measure of analysis (not at initial recognition).

The main source of data was produced by the calculation engine that was developed by a third-party vendor that implemented in the Portuguese company. It is necessary to highlight that the real values have been multiplied by a factor due to confidentiality reasons and maintain the data anonymised.

The inputs that are necessary to upload in the IFRS17 calculation engine are the Cash flows and assumptions files. The input files consider projected monthly Cash flows per cohort and the engine can recognize multi-currency data if applicable, but in the case of the group of products under analysis all the Cash flows are all in euros.

The output of the engine contains the Balance Sheet and the P&L of the period according to the valorisation method (GMM, VFA or PAA). The movements in the LRC, LIC, Best Estimates of Liabilities (BEL), RA, and CSM from the last reporting period to the current reporting period are also part of the outputs. Those values are important since it allows to track in a more detailed way the changes under the different scenarios.

On the other hand, a set of assumptions must be set:

1. IFRS 17 states that the assessment of whether a contract is in its scope must be made at the contract level, but since the contracts follow the characteristics of the product, it has been decided to carry out the analysis at the product level.
2. IFRS 17 does not specify the approach to be adopted for measuring the start date of each cohort, and the only requirement mentioned in the Standard is related to the maximum period between issuance dates of the contracts that make up the cohort. Therefore, the company defined the calendar year of the issuance date, as the cohort period for the purposes of a group of contracts.
3. For the analysis of the contracts, it will be considered as Coverage Units the reserves,
4. For the period under analysis the expected values of claims are the same as the ones that actually occurred during the reporting period (expected values equal to the actuals values);
5. For the Scenario 1, 2, and 3, the changes in the actuals were made in the reporting period and the analysis is based in the marginal effects of each change.

For the recognition of LC, the  $Factor\_Coverage\ Units_t$  will be applied to the following Loss Component amount:

$$LC^* = LC_{t-1} - Interest\ on\ LC_t + Increase\ on\ LC_t \quad (5)$$

Where:

$t$ : Current reporting date.



$LC_{t-1}$ : Loss Component at the end of the prior reporting date (t-1).

*Interest on  $LC_t$* : The amount of interest that the LC at the end of the prior reporting date (t-1) has earned during the current reporting year (t).

*Increase on  $LC_t$* : Increment in the Loss Component due to unfavourable assumption changes (favourable changes in the assumptions are not considered in the recognition of LC).

6. The entity considers a methodology based on the calculation of Risk Margin of Solvency II (Cost of capital approach) to compute the Risk Adjustment since it allows creating synergies with the others company's current procedures. The way how the Risk Margin is computed is explained in the APPENDIX B: Procedure adopted by the insurance company to compute its RA
7. The Risk Adjustment will be released during the remaining period of the contract.
8. To consider a product with discretionary features, the entity should define a threshold of substantial participation of benefits. In the practical case of the present internship report, the insurance company considered a threshold of 0%, it means that if the product has participation of benefits, it also has discretionary features.

Another important fact that should keep in mind for the analysis of the scenarios is the way how the Insurance Income Statement is calculated.<sup>2</sup>

### 3.4 Base Scenario

The calculations in the Scenario 0 (base scenario) were stated with the data at the end of the calendar year t considering all the contracts in each type of product that have been signed by that time. In the following lines, we will do a description of the main characteristics of Scenario 0 with data obtained from the Calculation Engine. The main description of the reasonability of the P&L will be done for the PPR product and the analysis of the next products will be focused on their own characteristics.

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<sup>2</sup> See formula 3: *Total Income Statement = Insurance Revenue – Insurance Services Expenses + Net Finance Result*

### 3.4.1 PPR

#### *Income Statement*

The following chart summarizes the main lines of the Income Statement for PPR:

INCOME STATEMENT	Base Scenario
Insurance Revenue	(4,287,493)
Expected claims and expenses	275,970
Claims and RA release adjustments for Loss Component	(4,645,806)
Release of risk adjustment to P&L	82,342
Insurance Services	(4,784,111)
Incurred claims and expenses	275,970
Changes relating to future Service (reversal of losses on onerous contracts)	(414,275)
Changes relating to future Service (rollforward of the LC for onerous contracts)	(4,645,806)
Net Finance Result	265,457
<b>TOTAL INCOME STATEMENT</b>	<b>762,074</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 4 – Income Statement in the Base Scenario, PPR

#### Insurance Revenue

The value in the “Expected claims and expenses” is computed as a positive revenue (275,970) because at inception it was allocated as liability, after it, it is allocated as a decrement in the liability side and as an increment in the equity, as a revenue. The amount does not go to "Cash and cash equivalents" in the assets side.

The “Expected claims and expenses” must be reduced by the loss recognized in the period (-4,645,806) because it is an onerous contract. To compute how much should be the recognition of the LC it was applied the formula (1) (notice that formula (1) shows the recognition of CSM, and the amortization of LC follows the same logic), having it in mind, will be necessary to compute  $LC^*$  according of formula (5) and the ratio of the coverage units. The following chart summarizes the calculation of the  $LC^*$  for the PPR:

Opening LC	525,249,948
Increase Loss component	-
Interest on Loss Component	(727,669)
LC*	524,522,280

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 5 – Movements in the LC, PPR

There were not new contracts, and the updated assumptions did not have unfavourable changes in the LC impact, then “Increase Loss Component” is 0. Moreover, the amount of interest accredited due to LC is 727,669, which represents the time value of the LC settled aside, on the whole, the  $LC^*$  is 524,522,280.

The  $Factor\_Coverage\ Units_t$  is 0.008857, which means that just almost 1% of the total Coverage Units estimated at inception were provided during the period, then the recognition of the LC (Roll-Forward CF (eop)) will be 4,645,806:

Release LC	
LC*	524,522,280
Factor	0.008857
Roll-Forward CF (eop)	4,645,806

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 6 – Release of the LC, PPR

The Risk Adjustment will be released in 82,342 and it is computed as an increment in the Insurance Revenue since, according to the Standard, the Risk Adjustment is considered as part of the liabilities at inception that every reporting period will be released on the P&L.

As conclusion, it is possible to see that since it is an onerous group of insurance products that have a considerable amount of LC, the main line that affects the Insurance Revenue is the recognition of the LC during the period:

<b>Insurance Revenue</b>	<b>-100%</b>
<i>Expected claims and expenses</i>	6.44%
<i>Claims and RA release adjustments for Loss Component</i>	-108.36%
<i>Release of risk adjustment to P&amp;I</i>	197%

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 7 – Proportion of the Main Lines in the Insurance Revenue

#### Insurance Service Expenses

The value of “Incurred claims and expenses” is 275,970, same as the “Expected claims and expenses”, which means that it has been expected a loss of 275,970 and in fact, it occurred (it was stated in the assumptions the actual reported are the same as the expected).

The entity revised the estimates of future Cash flows for the next years and has estimated that they will pay less than they were expecting (notice that assumption 4 only refers to claims in the reporting period, and does not say anything about future claims), making less onerous the contract in a value of 414,275, amount that was register in “Changes relating to future Service (reversal of losses on onerous contracts)”.

Another important line in the Insurance Service Expenses is the recognition of the Loss Component (“Changes relating to future Service (roll forward of the LC for onerous contracts)”). In the case of the entity under evaluation, the amortization is 4,645,806, which is allocated as a negative value that decreases the Insurance Service Expenses, the reason of it is because at inception a Loss Component was recognized in the Insurance Services as a positive number, then, every reporting period, that amount will be amortized.

As a conclusion, it is possible to see that since it is an onerous group of insurance products, the main line that affects the Insurance Revenue is the amortization of the LC during the period, due to PPR is an onerous product:

<b>Insurance Services</b>	<b>-100%</b>
<i>Incurred claims and expenses</i>	5.77%
<i>Changes relating to future Service (reversal of losses on onerous contracts)</i>	-8.66%
<i>Changes relating to future Service (rollforward of the LC for onerous contracts)</i>	-97.11%

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 8 - Proportion of the Main Lines in the Insurance Services Expenses, PPR

*II Liabilities*

As it has been stated in section 2, the liabilities are separated in three components (BEL, RA and CSM), in the practical case of the present internship report, there is no LIC for PPR:

<b>LRC</b>	<b>189,948,019</b>
<i>BEL</i>	181,344,327
<i>RA</i>	8,603,692
<i>CSM</i>	-
<b>LIC</b>	-
<b>TOTAL</b>	<b>189,948,019</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 9 – Disclosure of LRC, PPR

The entity has estimated as BEL 181,344,327 under the GMM methodology and as RA for non-financial risk 8,603,692<sup>3</sup> under the Cost of Capital methodology, being a total of 189,948,019 as LRC, which is the total amount of Liabilities since there is not liabilities for past claims (LIC).

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<sup>3</sup> The BEL and RA are computed considering the release during the period.

### 3.4.2 Open Unit Linked

#### I Income Statement

The following chart summarizes the main lines of the Income Statement for Open Unit Linked:

INCOME STATEMENT	Base Scenario
<b>Insurance Revenue</b>	<b>852,658</b>
<i>Expected claims and expenses</i>	956,681
<i>Claims and RA release adjustments for Loss Component</i>	(329,162)
<i>Release of contractual service margin to P&amp;L</i>	-
<i>Release of risk adjustment to P&amp;L</i>	225,139
<b>Insurance Services</b>	<b>10,757,123</b>
<i>Incurred claims and expenses</i>	956,681
<i>Changes relating to future Service (reversal of losses on onerous contracts)</i>	10,129,605
<i>Changes relating to future Service (rollforward of the LC for onerous contracts)</i>	(329,162)
<b>Net Finance Result</b>	<b>828,325</b>
<b>TOTAL INCOME STATEMENT</b>	<b>(9,076,140)</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 10 - Income Statement in the Base Scenario, Open UL

It is a case that some contracts at inception are onerous, and during the duration of the contract they became non-onerous because of updated assumptions, this is the case of the Open Unit Linked type of product under analysis:

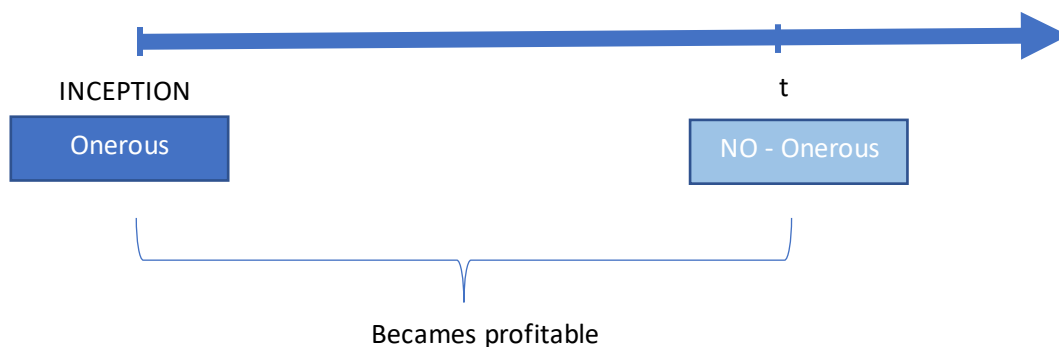


Figure 10 – Unit Link Timeline

At the beginning of the period under analysis it was non-onerous (even when the group of contracts became non-onerous, they do not leave the group of onerous contracts), which means that it was allocated a CSM value in the liability side, then, during the period under analysis

the assumptions were updated and the insurance company is expecting to receive more FCF, which will be reflected as a decrease in the CSM.

### Insurance Revenue

Regarding the release for LC and CSM, it has been an increase in the LC due to changes in the estimation of future Cash flows (10,129,605). On the other hand, in the last reporting period the group of contracts were not onerous, in the following chart it is explained how the movements in the CSM balance account were computed:

<b>Opening CSM</b>	<b>2,901,538</b>
<i>Accrete interest</i>	(4,020)
<i>Change in CF</i>	(12,798,277)
<i>Change in RA</i>	(228,846)
<b>Closing CSM</b>	<b>0.00</b>
<b>Increase Loss Component</b>	<b>10,129,605</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically

Table 11 - Movements in the CSM, Open UL

There was an “Opening CSM” at the beginning of the reporting period of 2,901,538, which gained an interest of 4,020, then since the “Change in CF” and “Change in RA” diminishes the CSM until it is less than 0, it will imply that it will be necessary to register a LC in the P&L of 10,129,605.

Moreover, in the LC lines, it is obvious that there is no Opening, then change in the LC of 10,129,605, will be registered in “Increase Loss component” line. It does not have interest on LC because it does not have opening value (even if there is an Increase Loss Component):

<b>Opening LC</b>	<b>-</b>
<i>Increase Loss component</i>	10,129,605
<i>Roll-Forward CF (bop)</i>	-
<i>Interest on Loss Component</i>	-
<b>LC*</b>	<b>10,129,605</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically

Table 12 - Movements in the LC, Open UL

The  $Factor\_Coverage\ Units_t$  is 0.032495, it means that 3.3% of the total Coverage Units were recognized during the period, then the recognition of the LC (“Roll-Forward CF (eop)”) will be 329,162:

Release LC	
<i>LC*</i>	10,129,605
<i>Factor</i>	0.032495
<i>Roll-Forward CF (eop)</i>	329,162

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically

Table 13 - Release of the LC, Open UL

The Risk Adjustment will be released in 225,139, considered as an increment in the Insurance Revenue.

In the previous group of products, the main line that has more relative importance in the Insurance Revenue was the “Claims and RA release adjustments for Loss Component”, in the case of Open Unit Linked product will not be the case since the release will be made just to the increment of LC (“Opening LC” is zero):

<b>Insurance Revenue</b>	<b>-100%</b>
<i>Expected claims and expenses</i>	-112.20%
<i>Claims and RA release adjustments for Loss Component</i>	38.60%
<i>Release of contractual service margin to P&amp;L</i>	0.00%
<i>Release of risk adjustment to P&amp;L</i>	-26.40%

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically

Table 14 - Proportion of the Main Lines in the Insurance Revenue, Open UL

#### Insurance Service Expenses

The “Incurred claims and expenses” and the “Expected claims and expenses” have the same value (956,681) and the increment in LC is allocated in Insurance Services (10,129,605). The Loss Component is amortized by 329,162 (onerous contract).

About the relative importance of each line in the Insurance Service, the line that has more relative importance is the one associated with the increase of the LC:



<b>Insurance Services</b>	<b>-100%</b>
<i>Incurring claims and expenses</i>	<i>-8.89%</i>
<i>Changes relating to future Service (reversal of losses on onerous contracts)</i>	<i>-94.17%</i>
<i>Changes relating to future Service (rollforward of the LC for onerous contracts)</i>	<i>3.06%</i>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 15 - Proportion of the Main Lines in the Insurance Services, Open UL

## *II Liabilities*

After the record of the Loss Component, the total Liabilities are 598,805,246, of it, 591,993,272 comes from the BEL, and 6,811,974 from RA. The reason of a no-zero value of the RA, is because of the risk component (death risk) associated to this group of insurance contracts:

<b>LRC</b>	<b>598,805,246</b>
<i>BEL</i>	<i>591,993,272</i>
<i>RA</i>	<i>6,811,974</i>
<i>CSM</i>	<i>-</i>
<b>LIC</b>	<b>-</b>
<b>TOTAL</b>	<b>598,805,246</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 16 - Disclosure of LRC, Open UL

### 3.4.3 Whole Life Annuity

#### Income Statement

The following chart summarizes the main lines of the Income Statement for Whole Life Annuity:

INCOME STATEMENT	Base Scenario
<b>Insurance Revenue</b>	<b>126,907</b>
<i>Expected claims and expenses</i>	161,092
<i>Claims and RA release adjustments for Loss Component</i>	(38,974)
<i>Release of risk adjustment to P&amp;L</i>	4,789
<b>Insurance Services</b>	<b>275,499</b>
<i>Incurred claims and expenses</i>	161,092
<i>Changes relating to future Service (reversal of losses on onerous contracts)</i>	153,381
<i>Changes relating to future Service (rollforward of the LC for onerous contracts)</i>	(38,974)
<b>Net Finance Result</b>	<b>19,124</b>
<b>TOTAL INCOME STATEMENT</b>	<b>(129,468)</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 17 - Income Statement in the Base Scenario, Whole Life Annuity

#### Insurance Revenue

It has occurred an increase in the LC due to changes in the estimation of future Cash flows (153,381), the increment represents 8% of the Opening LC. Compared to the previous group of products in this case the difference is greater since the group of insurance contracts are exposed to the longevity risk:

<b>Opening LC</b>	<b>1,915,539</b>
<i>Increase Loss component</i>	153,381
<i>Roll-Forward CF (bop)</i>	-
<i>Interest on Loss Component</i>	(2,654)
<b>LC*</b>	<b>2,066,266</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 18 - Movements in the LC, Whole Life Annuity

The  $Factor\_Coverage\ Units_t$  is 0.018862, it means that 2% of the total Coverage Units were recognized during the period, then the recognition of the LC (“Roll-Forward CF (eop)”) will be 38,974:

Release LC	
<i>LC*</i>	2,066,266
<i>Factor</i>	0.018862
<i>Roll-Forward CF (eop)</i>	38,974

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 19 - Release of the LC, Whole Life Annuity

The Risk Adjustment will be released in 4,789, considered as an increment in the Insurance Revenue.

The main line that has more relative importance in the Insurance Revenue is the “Expected claims and expenses”, which makes sense since one characteristic of the Whole Life Annuity is that it makes regular payments to the policyholder while they are alive, so, comparing with the previous group of products, on average, it is expected that the entity makes more annuity payments.

Insurance Revenue	-100%
<i>Expected claims and expenses</i>	-126.94%
<i>Claims and RA release adjustments for Loss Component</i>	30.71%
<i>Release of risk adjustment to P&amp;L</i>	-3.77%

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 20 - Proportion of Main Lines in the Insurance Services, Whole Life Annuity

### Insurance Service Expenses

The “Incurred claims and expenses” and the “Expected claims and expenses” have the same value (161,092) and the increment in LC is allocated in Insurance Services (153,381). The Loss Component is amortized by 38,974 (onerous contract).

Regarding the relative importance of each line in the Insurance Service, the line that has more relative importance is not only the “Changes relating to future Service (reversal of losses

on onerous contracts)” but also “Incurred claims and expenses”, since, as it has been stated before, the Whole Life Annuity implies periodic payments to the policyholder:

<b>Insurance Services</b>	<b>-100%</b>
<i>Incurred claims and expenses</i>	-58.47%
<i>Changes relating to future Service (reversal of losses on onerous contracts)</i>	-55.67%
<i>Changes relating to future Service (rollforward of the LC for onerous contracts)</i>	14.15%

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 21 - Proportion of the Main Lines in the Insurance Services, Whole Life Annuity

### *II Liabilities*

The total Liabilities are 13,827,636, of it, 13,575,382 comes from the BEL, and 252,253 from RA:

<b>LRC</b>	<b>13,827,636</b>
<i>BEL</i>	13,575,382
<i>RA</i>	252,253
<i>CSM</i>	-
<b>LIC</b>	-
<b>TOTAL</b>	<b>13,827,636</b>

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 22 – Disclosure of LRC, Whole Life Annuity

#### 4. ANALYSIS OF THE SCENARIOS

##### 4.1 Scenario 1 – Increment in Premiums

The increment in the premiums that is considered for the analysis is assumed to be made immediately after the end of the calendar year t:

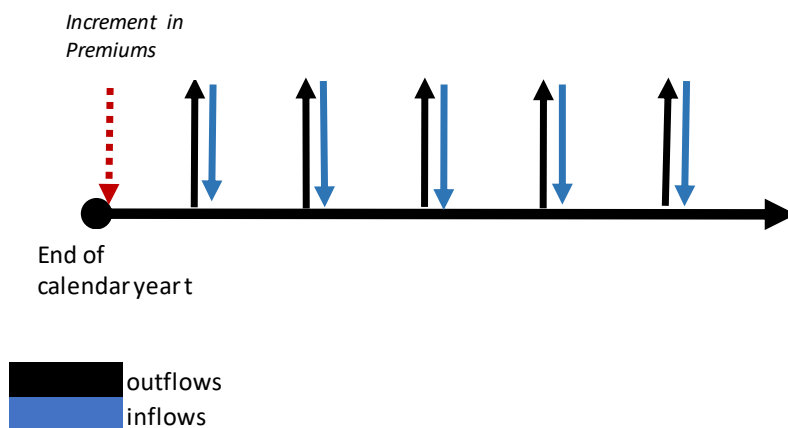


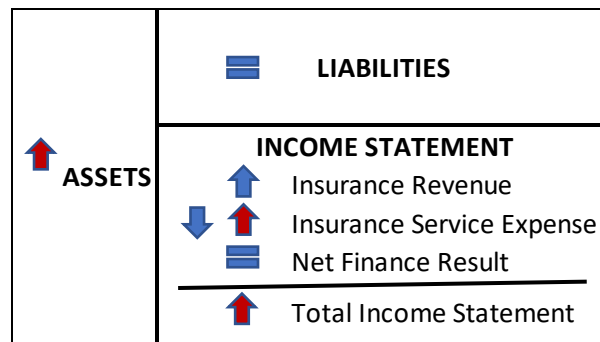
Figure 11 – Timing of premium increase

The first implication of it is that will be possible to see the direct effect of the changes without the influence of the interest rate. Moreover, it is assumed that the increment in the premiums is 40% of the total premiums received during the calendar year t.

In general, an increment in the premiums may increase the Insurance Revenue and decrease the Insurance Services Expenses, the effect will depend on the characteristics of the contract. Considering that the contracts that we are analysing are onerous, in the Insurance Revenue, an increment in the premium will decrease the LC and consequently the recognition of the LC in the period will decrease, which will cause an increment in the Insurance Revenue.

In the Insurance Service Expense, the decrease of the recognition in the LC will cause an increment in the Insurance Services. On the other hand, the decrease in the LC will be recognized in the Insurance Services.

As a result, the Income Statement will increase. On balance sheet terms, the equity will increase and the counterpart of it will be an increment in the assets:



Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Figure 12 – Movements in the Balance Sheet after Increment in Premiums

## 4.1.1 PPR

INCOME STATEMENT	Base Scenario	Scenario 1 (↑ premiums 969,509)	Variation	Ref.
Insurance Revenue	(4,287,493)	(4,287,493)	-	
Expected claims and expenses	275,970	275,970	-	A 1
Claims and RA release adjustments for Loss Component	(4,645,806)	(4,645,806)	-	A 2
Release of risk adjustment to P&L	82,342	82,342	-	A 3
Insurance Services	(4,784,111)	(5,753,619)	969,509	
Incurred claims and expenses	275,970	275,970	-	A 1
Changes relating to future Service (reversal of losses on onerous contracts)	(414,275)	(1,383,784)	969,509	A 4
Changes relating to future Service (rollforward of the LC for onerous contracts)	(4,645,806)	(4,645,806)	-	A 2
Net Finance Result	265,457	265,457	-	
<b>TOTAL INCOME STATEMENT</b>	<b>762,074</b>	<b>1,731,583</b>	<b>(969,509)</b>	<b>A 5</b>
LIABILITIES	Base Scenario	Scenario 1	Variation	Ref.
LRC	189,948,019	189,948,019	-	A 6
LIC	-	-	-	
<b>TOTAL LIABILITIES</b>	<b>189,948,019</b>	<b>189,948,019</b>	<b>-</b>	<b>A 6</b>
BALANCE LOSS COMPONENT	Base Scenario	Scenario 1 (↑ premiums 969,509)	Variation	Ref.
Opening LC	525,249,948	525,249,948	-	
Increase Loss component	-	-	-	
Roll-Forward CF (bop)	-	-	-	
Interest on Loss Component	(727,669)	(727,669)	-	
Roll-Forward CF (eop)	(4,645,806)	(4,645,806)	-	A 2
Loss Component FX Impact	-	-	-	
Loss Component Amortization	(414,275)	(1,383,784)	969,509	A 4
Closing LC	519,462,199	518,492,690	969,509	
LC*	524,522,280	524,522,280	-	A:2.1
Factor	0.0089	0.0089	-	A:2.2
Roll-Forward CF (eop)	4,645,806	4,645,806	-	A2

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 23 – BS and PL after Increment in Premiums - PPR

- **A1:** No changes since the increment in the premiums are inflows.
- **A2:** No changes since the recognition of the loss component was not affected:
  - **A.2.1:** The components for the calculation of the  $LC^*$  was not affected.
  - **A.2.2:** The factor does not change since the reserves does not change after the increment in the premiums.

- **A3:** No changes since the methodology of how the release of RA will be made was stated at inception.
- **A4:** Change due to changes in the Loss Component Amortization. When the insurance company receives more premiums, the group of contracts will be less onerous, then the Loss Component Amortization in absolute values will be higher and the increment will be in the same amount than the increment in premiums.
- **A5:** The increment in the Total Income Statement will be just affected by the increment in the Loss Component Amortization.
- **A6:** The liabilities will not change, because the obligation of the insurance company keeps the same, the counterpart of an increment in the premiums will be an increment in the asset (cash and cash equivalents).

#### *4.1.2 Open Unit Linked and Whole Life Annuity*

A characteristic of the Open Unit Linked and the Whole Life Annuity product is that in both cases the insurance company receives a single premium at the beginning of the contract (PPR receive periodic premiums), which implies that during the calendar year  $t$ , it has not estimated premiums received, then there is not effect of the Scenario 1 over the Balance Sheet Statement since the increment in premiums is 40% over the received premiums during the calendar year  $t$ .

#### *4.2 Scenario 2 – Increment in mortality*

The increment in the mortality were done directly to probability of death in the tables of mortality and only will affect the risk of a natural death.



## 4.2.1 PPR

INCOME STATEMENT		Base Scenario	Scenario 3 (↑ mortality)	Variation	Ref.
Insurance Revenue		(4,287,493)	(4,292,890)	(5,397)	
Expected claims and expenses		275,970	275,970	-	
Claims and RA release adjustments for Loss Component		(4,645,806)	(4,651,203)	(5,397)	A 1
Release of risk adjustment to P&L		82,342	82,342	-	
Insurance Services		(4,784,111)	(4,723,254)	60,857	
Incurred claims and expenses		275,970	275,970	-	
Changes relating to future Service (reversal of losses on onerous contracts)		(414,275)	(348,021)	66,254	A 2
Changes relating to future Service (rollforward of the LC for onerous contracts)		(4,645,806)	(4,651,203)	(5,397)	A 1
Net Finance Result		265,457	265,457	-	
<b>TOTAL INCOME STATEMENT</b>		<b>762,074</b>	<b>695,820</b>	<b>(66,254)</b>	
<b>LIABILITIES</b>					
		<b>Base Scenario</b>	<b>Scenario 3</b>	<b>Variation</b>	<b>Ref.</b>
LRC		189,948,019	190,014,273	66,254	A 2
LIC		-	-	-	
<b>TOTAL LIABILITIES</b>		<b>189,948,019</b>	<b>190,014,273</b>	<b>66,254</b>	<b>A 3</b>
<b>BALANCE LOSS COMPONENT</b>					
		<b>Base Scenario</b>	<b>Scenario 3</b>	<b>Variation</b>	<b>Ref.</b>
Opening LC		525,249,948	525,249,948	-	
Increase Loss component		-	-	-	
Roll-Forward CF (bop)		-	-	-	
Interest on Loss Component		(727,669)	(727,669)	-	
Roll-Forward CF (eop)		(4,645,806)	(4,651,203)	(5,397)	A 1
Loss Component FX Impact		-	-	-	
Loss Component Amortization		(414,275)	(348,021)	66,254	A 2
Closing LC		519,462,199	519,523,055	60,857	
LC*		524,522,280	524,522,280	-	A.1.1
Factor		0.0089	0.0089	.00001029	A.1.2
Roll-Forward CF (eop)		4,645,806	4,651,203	5,397	A 1

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 24 - BS and PL after Increment in mortality - PPR

- **A1:** In absolute values, the recognition of the LC during the period will be more since the factor has increased.
  - **A.1.1:** There is no change in the  $LC^*$  since by the end of the calendar year  $t$ , instead of an estimation of an increment in the Loss Component, it was estimated a decrease of it (the Loss Component Amortization is different from 0). The calculation of  $LC^*$  considers just increments in the Loss Components and not amortizations for it.

- **A.1.2:** The factor has been increased because the CU are the reserves, and the reserves are calculated considering the mortality rates.
- **A2:** The LRC decreases due to the Loss Component Amortization. In this group of products, the insurance company will pay to the policyholder for a fixed term or when the policyholder dies (which occurs first). When the policyholder dies before the fixed term, the insurance company will pay benefits to the beneficiaries. There are two contrary effects that affects the Loss Component Amortization when there is an increment in the mortality: first, the insurance company will pay less benefits to the policyholder since the policyholder will die earlier, which will make that the Loss Component Amortization increases; second, since the policyholder will die earlier, the benefits paid by the insurance company in case of death will be paid sooner, which will reduce the Loss Component Amortization, that effect will be higher, and then, as a result the Loss Component Amortization will be less.
- **A3:** The obligations decrease since the BEL has been increased by the mortality.

## 4.2.2 Open Unit Linked

INCOME STATEMENT	Base Scenario	Scenario 3 (↑ mortality)	Variation	Ref.
Insurance Revenue	852,658	868,664	16,006	
Expected claims and expenses	956,681	956,681	-	
Claims and RA release adjustments for Loss Component	(329,162)	(313,156)	16,006	A 1
Release of contractual service margin to P&L	-	-	-	
Release of risk adjustment to P&L	225,139	225,139	-	
<b>Insurance Services</b>	<b>10,757,123</b>	<b>10,275,819</b>	<b>(481,304)</b>	
Incurring claims and expenses	956,681	956,681	-	
Changes relating to future Service (reversal of losses on onerous contracts)	10,129,605	9,632,294	(497,310)	A 2
Changes relating to future Service (rollforward of the LC for onerous contracts)	(329,162)	(313,156)	16,006	A 1
<b>Net Finance Result</b>	<b>828,325</b>	<b>828,325</b>	<b>-</b>	
<b>TOTAL INCOME STATEMENT</b>	<b>(9,076,140)</b>	<b>(8,578,830)</b>	<b>497,310</b>	
LIABILITIES	Base Scenario 3	Scenario 3	Variation	Ref.
LRC	598,805,246	598,307,936	(497,310)	A 2
LIC	-	-	-	
<b>TOTAL LIABILITIES</b>	<b>598,805,246</b>	<b>598,307,936</b>	<b>(497,310)</b>	<b>A 3</b>
BALANCE LOSS COMPONENT	Base Scenario	Scenario 3	Variation	Ref.
Opening LC	-	-	-	
Increase Loss component	10,129,605	9,632,294	(497,310)	A 2
Roll-Forward CF (bop)	-	-	-	
Interest on Loss Component	-	-	-	
Roll-Forward CF (eop)	(329,162)	(313,156)	16,006	A 1
Loss Component FX Impact	-	-	-	
Loss Component Amortization	-	-	-	
<b>Closing LC</b>	<b>9,800,442</b>	<b>9,319,138</b>	<b>(481,304)</b>	
			0	
LC*	10,129,605	9,632,294	(497,310)	A.1.1
Factor	0.0325	0.0325	.00001600	A.1.2
Roll-Forward CF (eop)	329,162	313,156	(16,006)	A 1

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 25 - BS and PL after Increment in mortality – Open UL

- A1: It changed due to two effects:
  - A.1.1: The “Increase on Loss Component” is less, then  $LC^*$  will decrease.
  - A.1.2: The release factor increases, which will make that the Roll-Forward for Loss Component higher.

In this group of insurance products, the decrease of Increment on  $LC^*$  will be higher, as a result, the Roll-Forward for Loss Component will be less in absolute value.

- **A2:** The risk for this product is just for accidental deaths and does not cover death from natural causes, then, the effect is not high. The amount of -497,310 is due to the interest, the increment in the mortality will make that the policyholder live less time, and since the insurance company will pay to the policyholder revenues while he/she is alive, when he/she dies earlier, the obligations of the insurance company will decrease.
- **A3:** The obligations decrease since the BEL has been decreased by the mortality.

## 4.2.3 Whole Life Annuity

INCOME STATEMENT		Base Scenario	Scenario 3	Variation	Ref.
Insurance Revenue		126.907	128.483	1.576	
Expected claims and expenses		161.092	161.092	-	
Claims and RA release adjustments for Loss Component		(38.974)	(37.397)	1.576	A 1
Release of risk adjustment to P&L		4.789	4.789	-	
Insurance Services		275.499	(497.184)	(772.682)	
Incurred claims and expenses		161.092	161.092	-	
Changes relating to future Service (reversal of losses on onerous contracts)		153.381	(620.878)	(774.259)	A 2
Changes relating to future Service (rollforward of the LC for onerous contracts)		(38.974)	(37.397)	1.576	A 1
Net Finance Result		19.124	19.124	-	
<b>TOTAL INCOME STATEMENT</b>		<b>(129.468,35) €</b>	<b>644.790</b>	<b>774.259</b>	
LIABILITIES		Base Scenario	Scenario 3	Variation	Ref.
LRC		13.827.636	13.053.377	(774.259)	
LIC		-	-	-	
<b>TOTAL LIABILITIES</b>		<b>13.827.635,71 €</b>	<b>13.053.377</b>	<b>(774.259)</b>	A 3
BALANCE LOSS COMPONENT		Base Scenario	Scenario 3	Variation	Ref.
Opening LC		1.915.539	1.915.539	-	
Increase Loss component		153.381	-	(153.381)	A.2.1
Roll-Forward CF (bop)		-	-	-	
Interest on Loss Component		(2.654)	(2.654)	-	
Roll-Forward CF (eop)		(38.974)	(37.397)	1.576	A 1
Loss Component FX Impact		-	-	-	
Loss Component Amortization		-	(620.878)	(620.878)	A.2.2
Closing LC		2.027.293	1.254.610	(772.682)	
LC*		2.066.266	1.912.886	(153.381)	A.1.1
Factor		0,0189	0,0196	,00068840	A.1.2
Roll-Forward CF (eop)		38.974	37.397	(1.576)	A 1

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 26 - BS and PL after Increment in mortality – Whole Life Annuity

- **A1:** It changed due to two effects:
  - A.1.1: The “Increase on Loss Component” is less, then  $LC^*$  will decrease.
  - A.1.2: The release factor increases, which will make that the Roll-Forward for Loss Component higher.

In this group of insurance products, the decrease of the Increment on Loss Component will be higher than the increment of the factor, as a result, the Roll-Forward for Loss Component will be less in absolute value.

- **A2:** Considering that the insurance company has obligation to pay to the policyholder while he/she is alive, then, when the mortality increases the group of contracts will become less onerous, the change can be separated in two parts:
  - A.2.1: Reduction of the Increase Loss Component until 0.
  - A.2.2: Increment of the Loss Component Amortization.
- **A3:** The obligations decrease since the BEL has been decreased by the mortality.

## 4.3 Scenario 3 – Increment in the curve of interest

## 4.3.1 PPR

INCOME STATEMENT		Base Scenario	Scenario 3 (↑ curve of interest)	Variation	Ref.
Insurance Revenue	(4,287,493)	(4,287,493)	-		
Expected claims and expenses	275,970	275,970	-		
Claims and RA release adjustments for Loss Component	(4,645,806)	(4,645,806)	-		
Release of risk adjustment to P&L	82,342	82,342	-		
Insurance Services	(4,784,111)	(4,784,111)	-		
Incurred claims and expenses	275,970	275,970	-		
Changes relating to future Service (reversal of losses on onerous contracts)	(414,275)	(414,275)	-		
Changes relating to future Service (rollforward of the LC for onerous contracts)	(4,645,806)	(4,645,806)	-		
Net Finance Result	265,457	12,898,137	12,632,680		A 1
<b>TOTAL INCOME STATEMENT</b>	<b>762,074</b>	<b>13,394,754</b>	<b>12,632,680</b>		
<b>LIABILITIES</b>					
	Base Scenario	Scenario 3	Variation		Ref.
LRC	189,948,019	177,315,339	(12,632,680)		A 2
LIC	-	-	-		
<b>TOTAL LIABILITIES</b>	<b>189,948,019</b>	<b>177,315,339</b>	<b>(12,632,680)</b>		A 2
<b>BALANCE LOSS COMPONENT</b>					
	Base Scenario	Scenario 3	Variation		Ref.
Opening LC	525,249,948	525,249,948	-		
Increase Loss component	-	-	-		
Roll-Forward CF (bop)	-	-	-		
Interest on Loss Component	(727,669)	(727,669)	-		A 3
Roll-Forward CF (eop)	(4,645,806)	(4,645,806)	-		
Loss Component FX Impact	-	-	-		
Loss Component Amortization	(414,275)	(414,275)	-		
Closing LC	519,462,199	519,462,199	-		
LC*	524,522,280	524,522,280	-		
Factor	0.0089	0.0089	0.0000		A 4
Roll-Forward CF (eop)	4,645,806	4,645,806	-		

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 27 – Balance Sheet Statement and P&amp;L after Increment in the Interest Curve - PPR

- **A1:** Increase due to changes in the interest rate.
- **A2:** The interest rate increased, then the present value of the future Cash flows will be less.
- **A3:** The interest on LC is made based on the locked-in rate, then since in Scenario 3 what we are changing are the current rates, the interest on Loss Component is not affected.

- **A4:** The factor does not change because the coverage units are calculated based in the locked-in rate (the locked-in rate does not change).

### 4.3.2 Open Unit Linked

INCOME STATEMENT	Base Scenario	Scenario 3 (↑ curve of interest)	Variation	Ref.
Insurance Revenue	852,658	852,658	-	
Expected claims and expenses	956,681	956,681	-	
Claims and RA release adjustments for Loss Component	(329,162)	(329,162)	-	
Release of contractual service margin to P&L	-	-	-	
Release of risk adjustment to P&L	225,139	225,139	-	
Insurance Services	10,757,123	10,757,123	-	
Incurred claims and expenses	956,681	956,681	-	
Changes relating to future Service (reversal of losses on onerous contracts)	10,129,605	10,129,605	-	
Changes relating to future Service (rollforward of the LC for onerous contracts)	(329,162)	(329,162)	-	
<b>Net Finance Result</b>	<b>828,325</b>	<b>13,197,629</b>	<b>12,369,304</b>	A 1
<b>TOTAL INCOME STATEMENT</b>	<b>(9,076,140)</b>	<b>3,293,164</b>	<b>12,369,304</b>	
LIABILITIES	Base Scenario 3	Scenario 3	Variation	Ref.
LRC	598,805,246	586,435,942	(12,369,304)	A 2
LIC	-	-	-	
<b>TOTAL LIABILITIES</b>	<b>598,805,246</b>	<b>586,435,942</b>	<b>(12,369,304)</b>	A 2
BALANCE LOSS COMPONENT	Base Scenario	Scenario 3	Variation	Ref.
Opening LC	-	-	-	
Increase Loss component	10,129,605	10,129,605	-	
Roll-Forward CF (bop)	-	-	-	
Interest on Loss Component	-	-	-	
Roll-Forward CF (eop)	(329,162)	(329,162)	-	
Loss Component FX Impact	-	-	-	
Loss Component Amortization	-	-	-	
<b>Closing LC</b>	<b>9,800,442</b>	<b>9,800,442</b>	<b>-</b>	
LC*	10,129,605	10,129,605	-	
Factor	0.0325	0.0325	0.0000	
Roll-Forward CF (eop)	329,162	329,162	-	

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 28 - Balance Sheet Statement and P&L after Increment in the Interest Curve – Open UL

- **A1:** Increase due to changes in the interest rate.
- **A2:** The interest rate increased, then the present value of the future Cash flows will be less.



## 4.3.3 Whole Life Annuity

INCOME STATEMENT	Base Scenario	Scenario 3 (↑ curve of interest)	Variation	Ref.
Insurance Revenue	126,907	126,907	-	
Expected claims and expenses	161,092	161,092	-	
Claims and RA release adjustments for Loss Component	(38,974)	(38,974)	-	
Release of risk adjustment to P&L	4,789	4,789	-	
Insurance Services	275,499	275,499	-	
Incurred claims and expenses	161,092	161,092	-	
Changes relating to future Service (reversal of losses on onerous contracts)	153,381	153,381	-	
Changes relating to future Service (rollforward of the LC for onerous contracts)	(38,974)	(38,974)	-	
Net Finance Result	19,124	596,447	577,324	A 1
<b>TOTAL INCOME STATEMENT</b>	<b>(129,468)</b>	<b>447,855</b>	<b>577,324</b>	
<b>LIABILITIES</b>	<b>Base Scenario</b>	<b>Scenario 3</b>	<b>Variation</b>	<b>Ref.</b>
LRC	13,827,636	13,250,312	(577,324)	A 2
LIC	-	-	-	
<b>TOTAL LIABILITIES</b>	<b>13,827,636</b>	<b>13,250,312</b>	<b>(577,324)</b>	<b>A 2</b>
<b>BALANCE LOSS COMPONENT</b>	<b>Base Scenario</b>	<b>Scenario 3</b>	<b>Variation</b>	<b>Ref.</b>
Opening LC	1,915,539	1,915,539	-	
Increase Loss component	153,381	153,381	-	
Roll-Forward CF (bop)	-	-	-	
Interest on Loss Component	(2,654)	(2,654)	-	A 3
Roll-Forward CF (eop)	(38,974)	(38,974)	-	
Loss Component FX Impact	-	-	-	
Loss Component Amortization	-	-	-	
Closing LC	2,027,293	2,027,293	-	
LC*	2,066,266	2,066,266	-	
Factor	0.0189	0.0189	0.0000	A 4
Roll-Forward CF (eop)	38,974	38,974	-	

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 29 - Balance Sheet Statement and P&L after Increment in the Interest Curve – Whole Life Annuity

- **A1:** Increase due to changes in the interest rate.
- **A2:** The interest rate increased, then the present value of the future Cash flows will be less.
- **A3:** The interest on LC is made based on the locked-in rate, then since in Scenario 3 what we are changing are the current rates, the interest on Loss Component is not affected.
- **A4:** The factor does not change because the coverage units are calculated based in the locked-in rate (the locked-in rate does not change).

## 5. CONCLUSION

In the present report three main changes that could affect the base scenario were analysed, the objective of it is to see the sensitivity of the Financial Statements after the implementation of IFRS 17. The effect of the premiums will be reflected only in the Assets and Equity, while the effect on liabilities differs from the increment mortality and an increment in interest rates. On the other side, if there is an amortization of a LC, it will be increased by the increment in the premiums. Products that only have single premiums at the beginning of the contract will not be affected.













Moreover, the increment in mortality and in interest rates will be reflected in the equity and liability side and not in the assets. Regarding the increment in mortality, the effect of it will also depend on if the group of contracts will become more onerous or not. If the contract is becoming more onerous, which is the case of the Open Unit Linked since it has an “Increase Loss component”, an increment in the mortality will diminish the “Increase Loss component” since the policyholder will die earlier than expected, and the insurance company will pay the revenues for less time. The change in the “Increase Loss component” will have two effects: first, it will have an immediately effect decreasing the Insurance Service Expenses; second, it will be a decrease on the recognition of Loss Component in the period, but since the recognition of the Loss Component affects not only the Insurance Revenue but also the Insurance Service Expenses in the same amount, the net effect will be 0. As a result, the increase of the mortality will only decrease the Insurance Service Expenses, and as a result increasing the Equity side. The effect is similar in the Whole Life Annuity, but since the effect of the mortality is bigger than in the Unit Linked, it will not only be a decrement in the “Increase Loss Component” but also it will be registered a “Loss Component Amortization”, as a result, the effect on the Insurance Service Result will be bigger.

On the other side, if the contract is becoming less onerous (the contract has a “Loss Component Amortization”) which is the case of PPR, an increment in the mortality will affect the amortization of the LC, the increment or decrement of it will depend on the characteristic of the product, in the case of PPR it decreased which is translated as an increase in the Insurance Service Expense.

Regarding the increment in the interest rate, it will only affect the “Net Finance Result”, increasing its amount, the Interest on Loss Component and the coverage units will not be affected since both are calculated based in a locked-in-rate. On the other hand, it is necessary

to remark that of the three shocks the one that has more impact in the Income Statement of the three examples tested is the increment in the interest rate.

The following chart summaries the main impacts on the Equity, Liability and Assets side according to each shock:

	Equity	Liability	Assets
 Premiums			
 Mortality			
 Interest Rate			

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

Table 30 - Summary of the Three Impacts in the Balance Sheet Statement

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## APPENDICES

*APPENDIX A: Main Characteristics of the Products*

Type of Product	Type of premium	Possibility of Reinforcements	Garantee	Participation in Revenues	% Participation in Revenues	Life Risk	Discretionarity
PPR	Period	Not	Capital and Interest	Yes	90%	Death	Yes
Opened Unit Linked	Single	Yes	Not guaranteed	Not	N.A	accidental Dea	Not
Whole Life Annuity	Single	Not	Capital	Yes	85%	N.A	Yes

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report

*APPENDIX B: Procedure adopted by the insurance company to compute its RA*

1	Calculation of the present value of future cash flows in the event of a shock (the shock was determinated internally by the insurance company).
2	Calculation of the present value of expected future cash flows (BEL).
3	Calculation of the amount of additional capital that will be translated into the Solvency Capital Requirement (SCR) in SII, through the difference between the amount in point 1 and point 2. This difference must be truncated to zero and gross of reinsurance.
4	Calculation of the risk weighting matrix and allocation of the SCR by groups of contracts, through the product between the previously defined risk correlation matrix and the SCR matrix by type of risk of each group of contracts.
5	Determination of the diversified SCR for each group of contracts, through the product between the transposed risk diversification matrix of each group of contracts and the global SCR of each group of contracts.
6	Allocation of diversified SCR to each cash flow projection period through the "amount of capital at each date" recognition pattern.
7	Calculation of the cost of capital for each period by multiplying the diversified SCR (point 4) by the cost of capital rate. It should be noted that the cost of capital rate will be measured using the rate of 6%.
8	Determination of the risk adjustment of the group of contracts through the calculation of the present value of the cost of capital.

Source: Based on the information acquired from the work developed during the internship that was transformed, adjusted, and anonymised, specifically for this report