BBVA | PENSIONS & INSURANCE

Longevity risk in Latin America

FIAP 2011, Dominican Republic

May 19-20th, 2011

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Section 1

Forever young?

A question that actuaries across the world asked daily is:

How long will a retired person be receiving a pension?

In summary.

How long can the human race live?

Matusalen	967 years old (The Bible)
Thomas Parr	152 years old (Wikipedia)
Jeanne Calment	122 years old (Wikipedia)
Sarah Knaus	119 years old (Wikipedia)

Dr. Aubrey de Grey of Cambridge University confirmed that the human life expectancy could increase by 1,000 years if the way to repair cell damage is discovered.

We live longer than we are supposd to

- Life expectancy has not ceased to increase especially over the last 60 years
- Demographers have underestimated the growth in their projections
- Scientific advances and improved lifestyles can make it even longer

What repercussions does this have for the industry?

Section 1

Pension plans and the elderly (I)

Longevity risk

Retirement schemes (three forms of retirement)	Longevity Risk (that the population live longer than mortality tables project)
Scheduled withdrawl	Funds run out (Risk lies with the affiliate)
Annuities	If the pensioner lives longer than is calculated, the risk lies with the insurance company
Mixed schemes	Shared risk between the pensioner and the insurance company

Section 1

Pension plans and the elderly (II)

Longevity risk and the accumulation stage

A few important questions	Dilemma
Are the contributions appropriate?	This depends on the mortality table estimates
Are the mortality tables conservative?	There is evidence that this tendency has happened in many countries
What are the associated risks?	Incresases in life expectancy over the estimate may be a major social risk

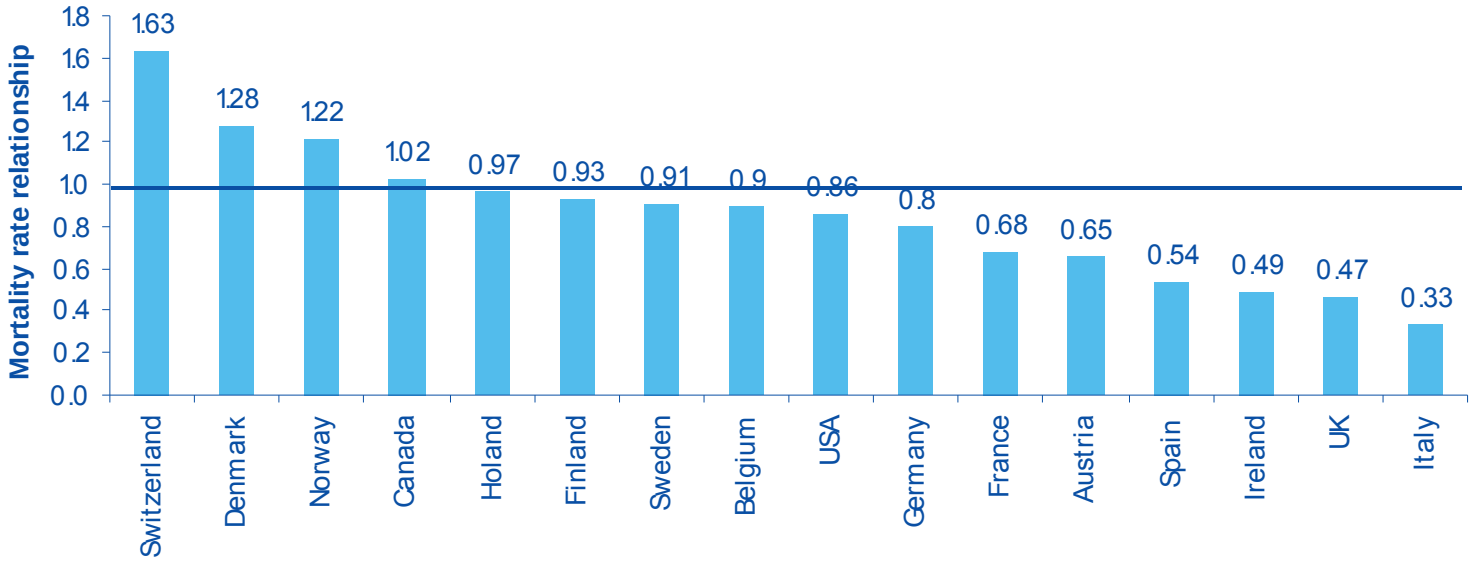
Section 1

And the measurement problems…

There are important differences between the survival probability used by the industry and that which is actually observed

Ratio of mortality rate considered by the industry in relation to the observed from the age of 65

The probability that death observed coincides with the tables used by the industry



Section 1

An important risk to take into account

What risks can Latin America be running in regards to this concept for both the industry and the affiliates?

Cause

- Insufficient information on mortality statistics
- Inappropriate techniques used in some countries
- Misjudgement of the associated risks used by the authorities

Effect

- In Latin America there has been a cronic lack of attention to these risks and the industry's use of tables with long updating delays, which accentuate the aforementioned risk

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Section 2

Mortality tables in Chile

The case of Chile is the most advanced and has recently taken consciousness of constantly updating mortality tables

Until 2004

They exclusively used the US tables for many years

Since 2004

Mortality tables RV-2004 were jointly created by the Superintendency of the AFP and the Superintendency of Securities and Insurance using data from old-age pensioners in the years 1995-2003

Since 2008

Tables were updated prior to RV-2009

Section 2

Mortality tables in other countries

However, in the rest of Latin America serious deficiencies in updating mortality tables are still observed

Colombia

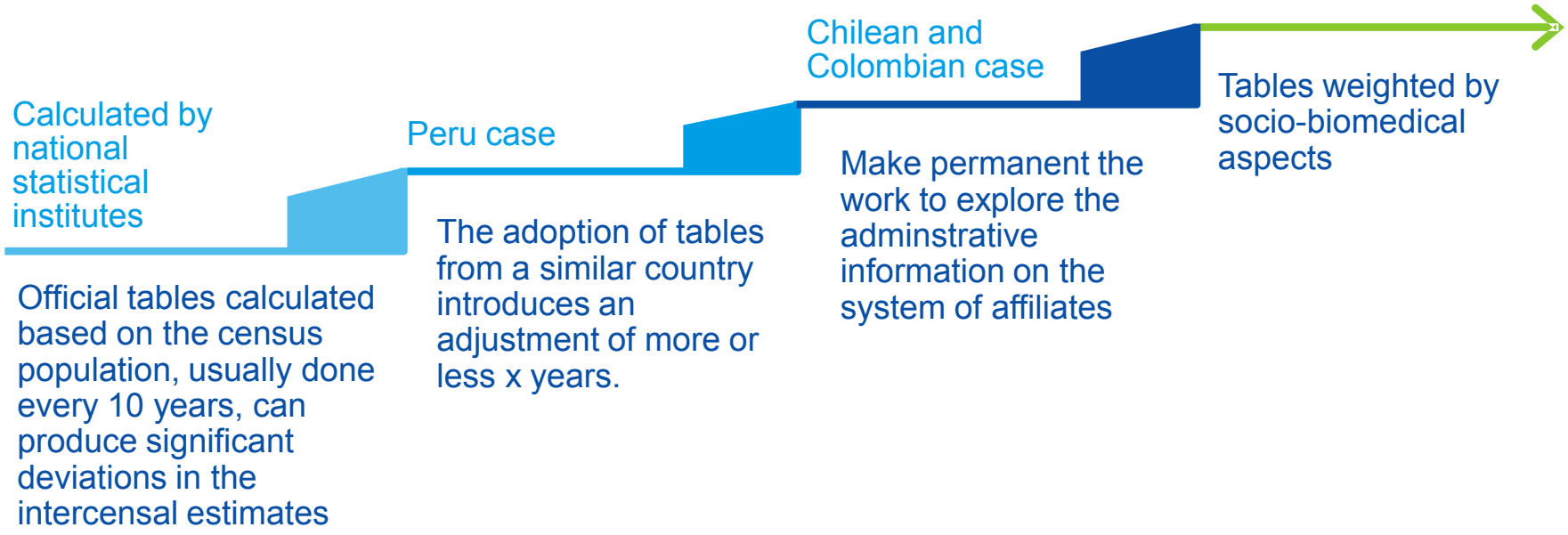
From 1994, Colombia has used the same annuitants mortality rates (RV89 about the experience of ‘89). Only recently has there been made a new RV08

Peru

In the case of Peru, in 1993, they approved the use of the Chilean RV85 tables for annuities. Only in 2006 did they approve the use of the Chilean RV2004.

Section 2

Differing calculation methodologies



Section 2

Chilean case

At the moment we are observing with the Chilean case for four reasons:

1. The tables RV2004 and RV2009 prominently reflect the lastest estimation techniques for mortality

2. However, they have not made long term projections for dynamic generational tables (1)

3. There is sufficient information to perform a sample test of equality with other developed countries

4. The conclusions obtained can be extrapolated to other Latin American countries

(1) Mortality measurements of successive generations continuously in time

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Section 3

Our projection methodology (I)

We intend to respond to the following questions

- Which developed country has the most similar mortality table to Chile?
- How has life expectancy grown in the developed country selected?
- How will life expectancy of the country selected converge with that of Chile?

Section 3

Our projection methodology (II)

Which developed country has the most similar mortality table to Chile?
Sample test of equality:

There is a classic method of comparing mortality tables associated with varing experiences proposed by Forfar *et al* (1988)

These authors propose nonparametric tests for comparisons:

- Sign tests: the mortality level
- Sequence tests: the form of the mortality tables
- χ2 (chi) tests: of a similar pattern between the two tables

Section 3

Looking for the country most similar to Chile

Males / Austria

Austria	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
signos	1	1	1	0	0	1	1	1	1	1	1	1	1
rachas	1	0	1	1	1	0	1	1	1	1	1	1	1
chi	1	1	1	1	1	1	1	1	1	1	1	1	1
Chile	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004

Women / New Zealand

New Zealand	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
signos	1	1	1	1	1	1	1	0	1	1	1	1	1	1
rachas	1	1	1	1	1	1	0	1	1	1	0	1	1	1
Chi	1	1	1	1	1	0	1	1	1	1	1	1	1	1
Chile	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007

1=Accept the nule hypothesis of the equal sample
0=Reject the nule hypothesis of the equal sample

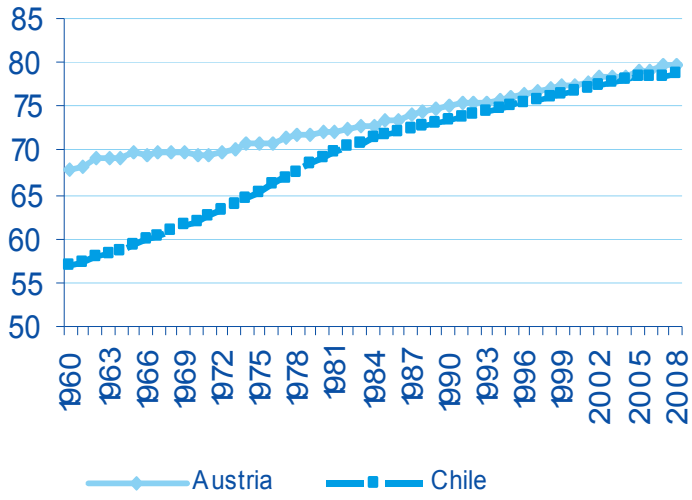
- We have compared the Chilean data with 20 countries and after analyzing 400 combinations we find that:
  - The Chilean dynamic generational tables are equivalent to Austria -4 years for males and New Zealand – 6 years for females
  - The generational tables of Austria and New Zeland are available since 1948, allowing the creation of projections in the long term while those of Chile are available since 1992. (www.mortality.org)

Section 3

Evolution of life expectancies (I)

Life expectancy from birth in Chile and Austria (males)

- Sharp increase of life expectancy from birth in Austria and Chile
- The convergence is observed to 1985 has reduced the gap in life expectancy at birth of 10.9 years in 1960 to 1.9 in 2008
- Since 1985, the spread has remained relatively constant at around 1.6 years on average



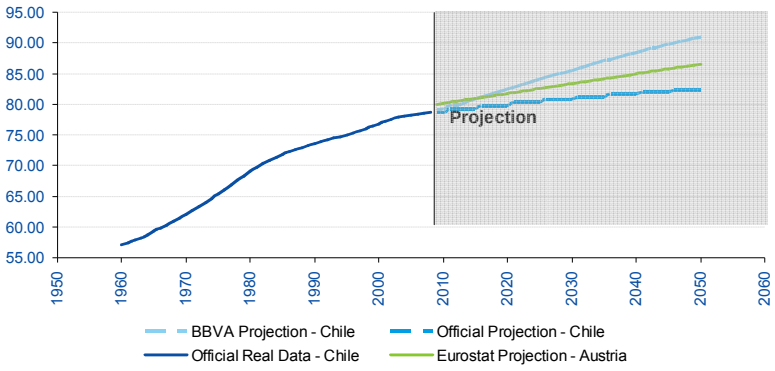
Source: www.Mortality.org

Section 3

Evolution of life expectancies (II)

Life expectancy projections in Chile from dynamic generational tables (Austria-4 years)

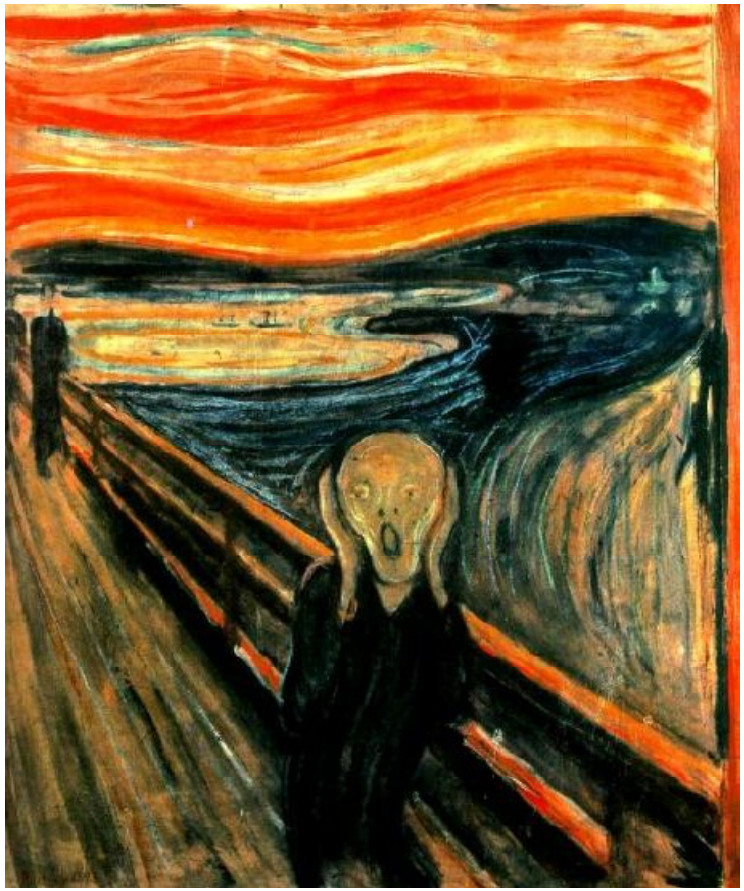
- Our projections from a ARMA model of age-specific series offers a life expectancy of 90,91 years in 2050
- The INE of Chile projects a life expectancy at birth of 82,14 years
- The projections of Europop for Austria in 2050 is 86,5. Will they diverge?



Source: BBVA research and information from the Chilean INE

Section 3

Evolution of life expectancies (III)



There is no consensus on the predictive models

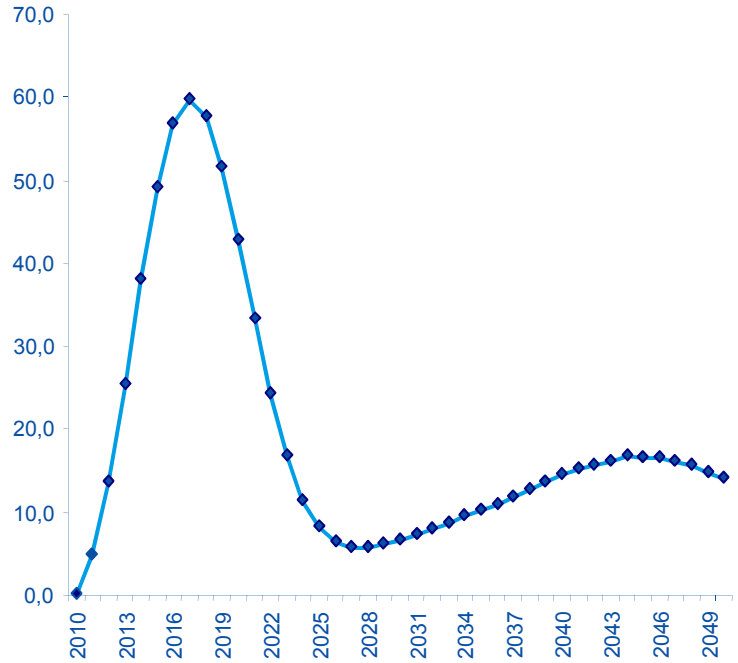
Differing mortality table estimations

Uncertainty

RISK

Section 3

Longevity risk in Latin American countries (I)

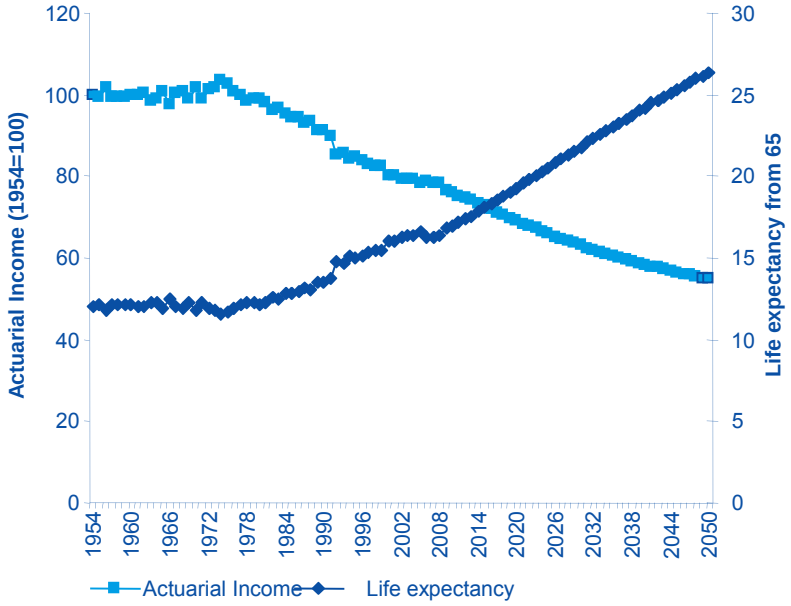


Simulation of systematic risk in the use of mortality tables has a 1% uncertainty in the Chilean mortality tables (in millons of dollars)

- A deviation of 1% in the mortality tables used to calculate annuities would translate into losses for the industry that could reach $60 million dollars in 2017 due to:
  - Effects of greater longevity of the affiliate
  - Effect of defect rate

Section 3

Longevity risk in Latin American countries (II)

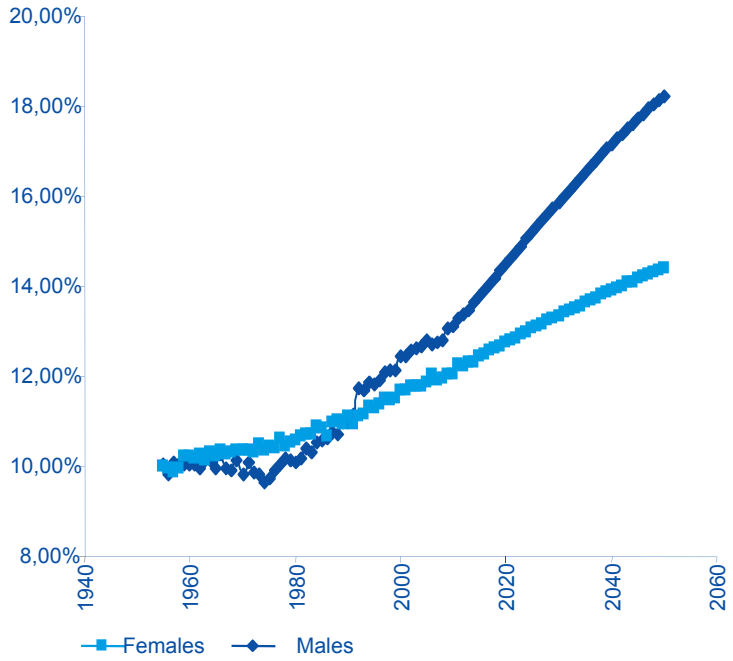


Evolution of life expectancy and male pensions

In the case of not making supplementary contributions, future generations could see their retirement decrease by 50% due to increased life expectancy

Section 3

Longevity risk in Latin American countries (III)



Evolution in the contribution rate necessary to maintain the current replacement rate

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Section 4

A few conclusions for the study

1. There are considerable uncertainties about the evolution of life expectancy in Latam that could pose a significant risk to both the pension insurance company and the very members of the system

2. Currently there is not sufficient information to create quality and regular mortality tables for the majority of countries in Latam

3. It is a societal problem whose solution must begin with the authorities and the industry as a whole

Section 4

Proposals for the industry

As a result of the above, we propose the formation of the:

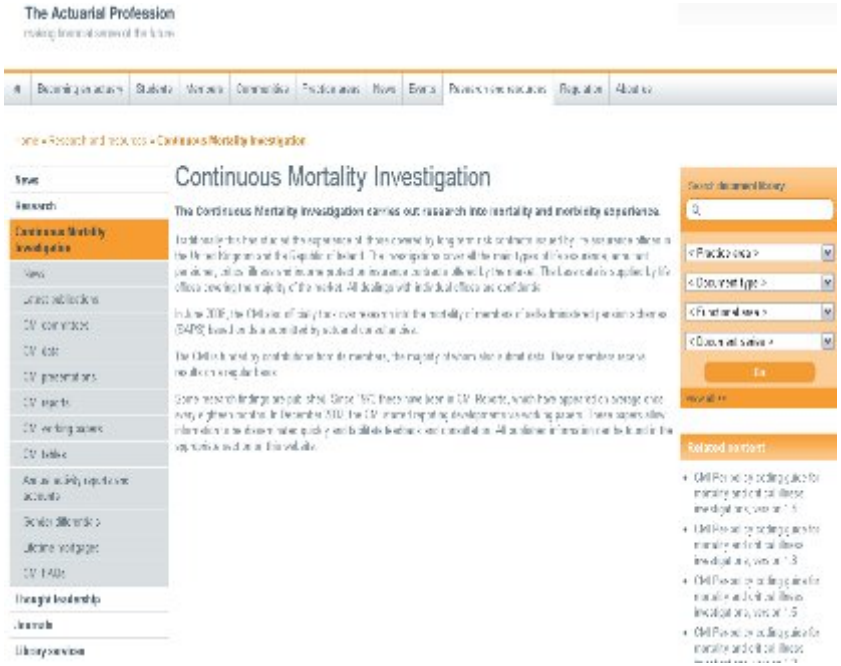
Commission of Actuarial Studies (CEA-FIAP)

This would be a technical and consultive body composed of top industry specialists in actuarial study and constantly provide the necessary information regarding mortality tables to reduce the risk of longevity in all Latin America and other countries interested

Section 4

International experience and the CEA-FIAP (I)

This body could inspire the The Continuous Mortality Investigation Bureau that exists in the United Kingdom since 1843



The main tasks include:

- It is sponsored by an organization of actuaries
- They make independent investigations
- Their research is ongoing and regular
- The processing of the information is strictly confidential
- Regular production of updated mortality tables
- Provides technical training to the specialists of the organization

International experience and the CEA-FIAP (II)

The CEA could have a concrete structure and function

Its structure could contain the following points:

- Be independent in its operation
- With an autonomous budget, and own, sufficient resources
- With specialists from those associated with the FIAP

International experience and the CEA-FIAP (III)

The CEA could have a concrete structure and function

It could have the following responsibilities:

- Create a top level technical team to collect, process and display information necessary to providing the industry with the most updated mortality tables of the highest quality
- Assume an advisory benchmark position to assist the regular authorities in proposing official tables for the industry and to maintain an active partnership with them
- Help those countries with the greatest need in making available updated tables and match the quality of those used by the most advanced countries
- Be the technical representative body of the FIAP in institutions and international organizations in actuarial matters, and to collect the latest developments in the field to be developed anywhere in the world
- Provide technical training to its members

Section 4

CEA-FIAP

"We take calculated risks, which is different from demonstrating recklessness"

"A good plan today is better than a perfect one tomorrow"

(General George S. Patton)