

**REPUBLIC OF MALTA**

**PENSIONS IN MALTA:**

**ACTUARIAL ANALYSIS AND OPTIONS**

**FOR A SECOND GENERATION REFORM**

**MIDDLE EAST AND NORTH AFRICA  
HUMAN DEVELOPMENT GROUP (MNSHD)**



## ACCRONYMS

|          |  |
|----------|--|
| Census05 | National Census of 2005                                |
| AWG      | Ageing Working Group                                   |
| EU       | European Union   |
| FDC      | Financial Defined Contribution                         |
| IPD      | Implicit Pension Debt                                  |
| ISSA     | International Social Security Association              |
| IWB      | Insured Wage Bill                                      |
| MCESD    | Malta Council for Economic and Social Development      |
| MFEI     | Ministry of Finance, the Economy and Investment        |
| MFSA     | Malta Financial Service Authority                      |
| OECD     | Organisation for Economic Co-Operation and Development |
| NDC      | Notional Defined Contribution                          |
| NSO      | National Statistics Office                             |
| PAYG     | Pay As You Go  |
| PROST    | Pension Reform Options Simulation Toolkit              |
| PWG      | Pension Working Group                                  |
| WB       | World Bank   |
| WHO      | World Health Organization                              |

|                         |                        |
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# **PENSIONS IN MALTA: ACTUARIAL ANALYSIS AND OPTIONS FOR A SECOND GENERATION REFORM**

## **INTRODUCTION**

1. In 1979, Malta adopted a universal contributory Social Security scheme with wide coverage to employees and self employed, complemented by a noncontributory scheme for specific groups or categories excluded from the general contributory regime. Demographic changes, however, have revealed a lack of sustainability beginning in the early 2000s and the serious need to revisit the Maltese pension system to ensure that it can provide adequate and fiscally sustainable benefits for workers in the future.
2. Since 2003, the World Bank has been providing technical assistance to support the efforts of the Maltese government to introduce a comprehensive pension reform program with the primary objective of addressing the lack of sustainability of the pension system. A report produced in October 2003 showed that parametric reforms were needed to shift to a sustainable system but the changes required would have the effect of significantly compromising the level of pensions. However, since mandatory pension contributions were capped at a low ceiling (estimated at 13% of the average wage bill at that time), the report recommended the possibility of introducing a funded second pillar by adding 2 percentage points of contributions from both employees and employers and gradually increasing this to 5 percentage points by 2020 to provide adequate income replacement.
3. Reforming the pension system has been a priority for the Maltese government. To deepen the analysis, further evaluate reform options, provide specific advice to the government, and propose a strategy for reform, a special working group was created. The group includes the key stakeholders in the pension sector, namely: (i) the Social Security Agency, (ii) The Malta Financial Service Authority (MFSA), (iii) the Economic Policy Division of the Ministry of Finance, and (iv) the Malta Council for Economic and Social Development (MCESD).
4. The Pension Working Group made significant contributions to the evaluation of pension reform options, relying extensively on quantitative analysis and projections produced by the Economic Policy Division of the Ministry of Finance. The proposals under analysis involved a shift to a multipillar model with basic pensions provided by the Social Security Agency on a pay-as-you-go (PAYG) basis, complemented with second and third tier pensions to be financed from a funded scheme.
5. The Maltese government decided to implement the process in a gradual manner starting with the adoption of a set of parametric reforms to the PAYG component. Changes that were introduced by law in 2006 included: (i) a gradual increase and convergence of retirement ages for men and women, (ii) a gradual increase in the

minimum number of years of contributions required for full pension entitlement, (iii) changes in the definition of pensionable salary for retirees born after 1961 (to the average of the best 10 years of earnings instead of the average of best 3 years), and (iv) a new definition of the guaranteed minimum pension (to 60% of the national median income instead of 80% of the minimum wage).

6. The introduction of second and third pillars (i.e., mandatory and voluntary funded pension schemes) was viewed as a structural shift that merited further investigation and discussion and was therefore postponed until a second phase of reform could take place. At present, discussions concerning the funded component remain open although some actions have already been adopted, including (i) the institutional setup for the development of private pension management under the supervision of the Malta Financial Service Authority (MFSA) and (ii) the establishment of a regulatory framework for the provision of private pensions.
7. In this next phase of reform, the Maltese government needs to resolve a number of critical questions, such as the following: Has the global financial crisis substantially altered the initial preconditions required to support the introduction of a second and third pillar? Will the issuing of regulations by MFSA be enough to entice institutional investors to offer private pension plans more actively? Are the local financial and capital markets prepared to receive and invest a significant inflow of long term savings? What are the expected fiscal and capital market effects of private pension development? Is the Maltese population prepared to understand the logic of defined contribution pensions and to take rational decisions in matters that may affect their long term retirement income? In addition, any comprehensive program of reform should provide a consistent framework for the coverage of other social security programs, notably invalidity and survivorship benefits. The Social Security authorities are aware of the importance of adopting consistent reforms and the risks of addressing only issues relating to old age pensions. The definition of a consistent Social Security benefit package requires a careful review of the current status of invalidity and survivorship pensions and unemployment insurance; these benefits, together with old age pensions and health insurance, are all financed through a common contribution levy but separate pricing and actuarial studies for each have yet to be produced.
8. This report discusses some of the most critical questions in this current phase of the reform process, as were listed above. The remainder of the report is divided into three parts. The first part provides an actuarial assessment of first pillar, invalidity, and survivorship pensions. The second part evaluates options to improve the sustainability of the first pillar pension scheme (to include an analysis of options using simulations prepared with the World Bank's Pension Reform Options Simulation Toolkit or PROST model). The third part analyzes options to introduce second and third pillar pension schemes and discusses their enabling conditions.

## **PART I: ACTUARIAL ANALYSIS OF THE PENSION SYSTEM IN MALTA**

9. The first part of this report is an actuarial assessment of existing first pillar pension provisions, including a costing of survivorship and invalidity pensions. In contrast with old age pensions, the latter are less exposed to deterministic trends and, to a large extent, depend on the definition that different countries adopt for benefits and also for eligibility conditions. Consequently, significant differences are observed in costs and coverage across countries.
10. Actuarial analysis provides a framework to assess the current and projected financial situation of insurance schemes. In the field of Social Insurance, it is mainly used to assess the sustainability of schemes. This requires an exercise of predicting results based on information and reasonable assumptions regarding population, labor force, covered population (members and beneficiaries), revenues and expenditures. Mc Gillivray (ISSA, 2010) proposes a list of questions that the actuarial analysis of social insurance schemes can respond:
  - a. *How will future income and expenditures of the scheme develop?*
  - b. *What will be the effect on the government budget?*
  - c. *What financial system is appropriate for the scheme?*
  - d. *Is the scheme financially sustainable at the present contribution rate and benefit levels? If not, what alternative measures to ensure sustainability should be considered?*
  - e. *How does the scheme react to potential future demographic and economic developments?*
  - f. *What are the current and projected future replacement rates (cash benefit/insured earnings) of the scheme?*
  - g. *What are the income distribution effects of the scheme?*
  - h. *What are the financing and income replacement implications of proposed reforms?*
11. Actuarial analysis is important to predict potential imbalances in the social insurance accounts, as well as their size and potential effects. It also provides a useful tool to assess the impact of alternative instruments, such as changes in key parameters (retirement age, contribution rates, and benefit formulas). The accuracy of prospective analysis depends to a large extent on: (i) complete and accurate data to characterize the current situation (baseline); (ii) reasonable macroeconomic, demographic and labor market assumptions; (iii) behavioral assumptions, particularly relevant in the analysis of reform scenarios.
12. The sensitivity of the conclusions of the actuarial analysis to the quality of data and assumptions needs to be carefully weighted by social security managers and policy makers, and to a large extent they need to be involved in the process in order to contribute experience from the ground and minimize discretionality of the actuary. Sources of information include: (i) official public sources such as those of directions

of statistics, ministries of finance and labor, social security administration and other sources; (ii) international organizations such as IMF, ILO, WHO, World Bank, etcetera; (iii) academic institutions; (iv) external sources such as studies including the experience of other countries in comparable context. The present actuarial analysis for the Maltese pension system made extensive use of these sources:

- a. Data from National Statistics Office, Ministry of Finance, Social Security Institution, Inland Revenue Department, Pension Working Group;
- b. Data from Ageing Working Group (AWG), EU, WHO, IMF, World Bank, International Social Security Association (ISSA);
- c. Assumptions based on discussions with relevant stakeholders, including the official sources mentioned in (a) plus others such as Malta Financial Service Authority (MFSA), Central Bank of Malta, Malta Capital Market.

13. Table 1 includes some of the relevant data and assumptions used in the actuarial analysis.

**Table 1 – Data and assumptions used in Actuarial Analysis**

| <b>DATA</b>                        |                                     |  | <b>ASSUMPTIONS</b>                      |                          |                             |
|------------------------------------|-------------------------------------|--|---|--------------------------|-----------------------------|
| <b>Demographic</b>                 | <b>Labor Market</b>                 | <b>Economic</b>                          | <b>Demographic and Labor Market</b>     | <b>Economic</b>          | <b>Behavioral</b>           |
| Population by age and gender       | Activity rates by age and gender    | GDP                                      | Population growth                       | GDP growth               | Future female activity rate |
| Fertility rate                     | Wages                               | Inflation                                | Projected fertility and mortality rates | Projected inflation rate | Future youth activity rate  |
| Mortality rate by age and gender   | Unemployment rate by age and gender | Interest rate                            | Projected activity rate                 | Projected wage growth    | Effective retirement age    |
| Invalidity rates by age and gender |                                     | Social Security revenues                 | Projected unemployment rate             | Projected interest rate  |                             |
|                                    |                                     | Social Security expenditures             | Projected invalidity rates              |                          |                             |
|                                    |                                     | Return on investments of Social Security |   |                          |                             |

14. The results of an actuarial model are therefore not deterministic. Projections reflect the understanding of the initial conditions and the accuracy of relevant assumptions. In both cases, predictions are based on a participatory process whereby the technical analyst relies on the results of dialogue with key official sources and stakeholders.
15. While actuarial projections do not yield a single right answer, they should lie within a reasonable range<sup>1</sup>. Concepts of “equilibrium”, “deficit” or “surplus”, therefore, do not have certain values but “intervals” with certain probabilities. Another consequence is that actuarial valuations should be conducted after a certain minimum number of years in order to update data and adjust assumptions. Legal requirements requiring actuarial valuations every three to five years are frequent and best international practice.
16. The main objective of this part of the report is to analyze the current (2009) situation for the social security system in Malta and to evaluate, under a basic scenario, the system’s projected expenditures and revenues and potential demand for public resources to fund the deficits that emerge. A detailed description of the social security system is available on MFEI (2009) and additional considerations on projections and methodology are available in Part II of this report.
17. The contribution rate to social security is not segregated by type of benefit. Financing mechanisms (together with flat benefits – given the significant impact of minimum pensions) do effect income redistribution but this is at the expense of very low replacement ratios for high income workers.
18. This remainder of this part of the report is divided into four sections: (i) an overview and discussion of social security trends, (ii) an evaluation of demographics perspectives and an assessment of projected social security financial flows, (iii) a discussion of survivorship (widows) pensions, and (iv) a discussion of invalidity pensions.

### **Overview and general trends**

19. During 2009, there were approximately 159 thousand contributors to the social security system in Malta. The mean age was 37 years (34 for females and 39 for males), the proportion of males was 74%. The distributions by age and gender are shown in Figure 1.

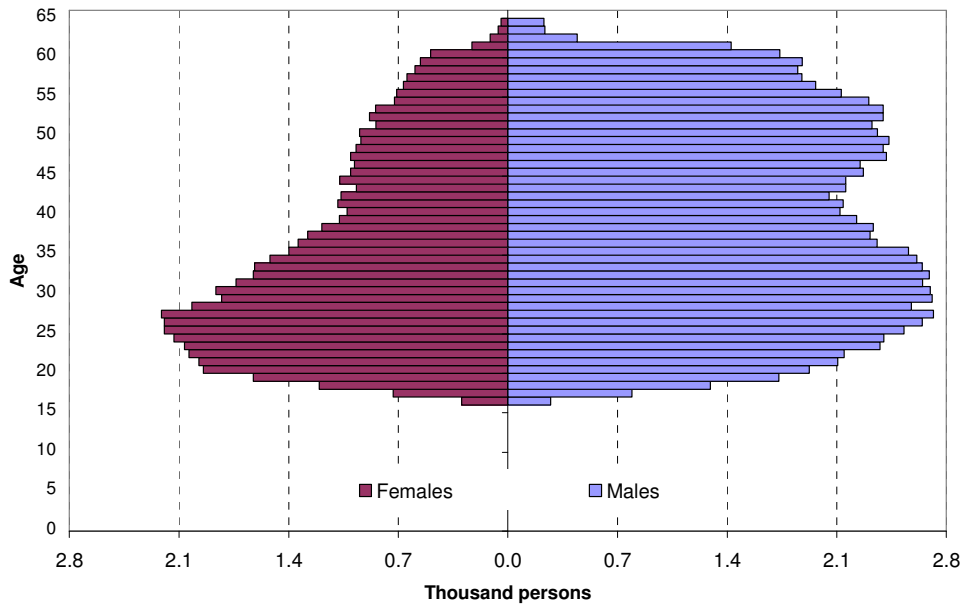
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<sup>1</sup> Mc Gillivray (2010).



**Figure 1**

**Contributors to Social Security, Malta 2009**

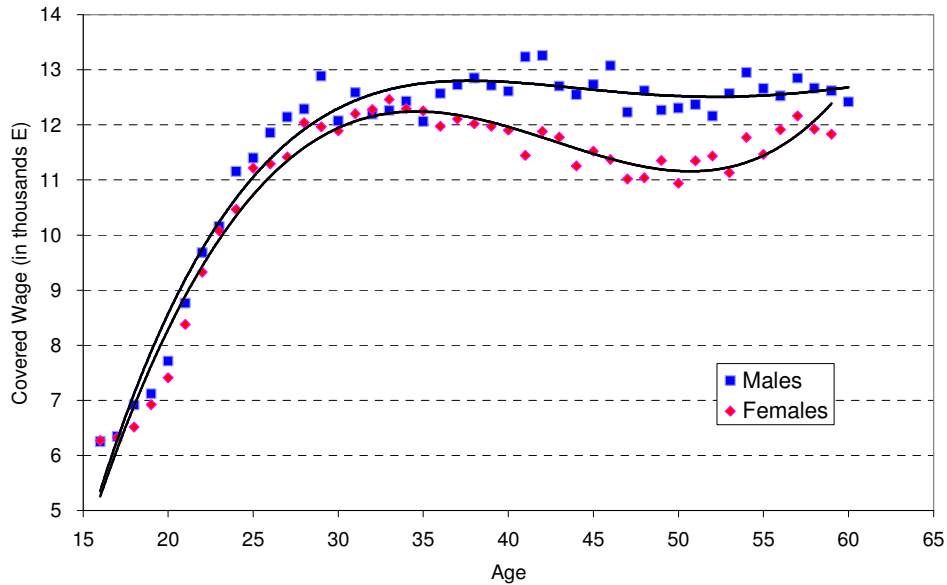


*Source: Own estimates based on information provided by Inland Revenue Department*

20. While total salary averaged €12,342, the mean covered wage was €11,696 (€11,255 for females and €11,947 for males, a differential of only 6%). The average by age (for each sex) is shown in Figure 2. Wages exhibit a clear growing trend from age 16 to 31 and are relatively stable thereafter.

**Figure 2**

**Covered Wage by Age and Sex, Malta 2009**



*Source: Own estimates based on information provided by Inland Revenue Department*

21. Beneficiaries can be grouped into three categories: old age, survivorship (widow) and invalidity. The main characteristics, as of the end of 2009, are summarized in Table 2.

**Table 2**

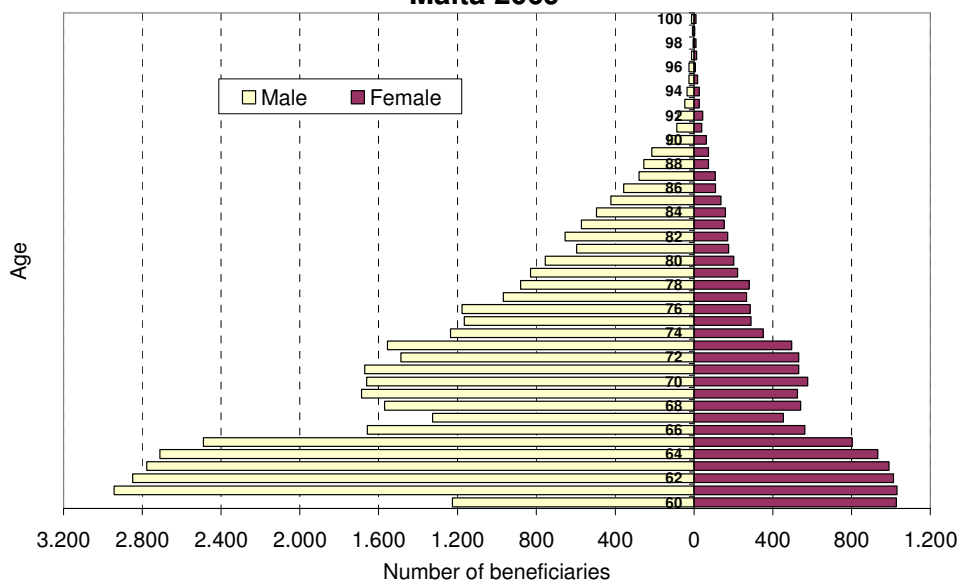
| Group of Pension | Cases         | Mean age    | Proportion female | Mean annual payment | Median annual payment | Replacement Rate (on total average salary) |
|------------------|---------------|-------------|-------------------|---------------------|-----------------------|--|
| Retirement       | 52 656        | 69,6        | 26,1%             | 6 836               | 6 755                 | 54,7%                                      |
| Widow            | 16 165        | 73,9        | 99,2%             | 6 874               | 6 626                 | 53,7%                                      |
| Invalidity       | 7 499         | 56,0        | 25,4%             | 5 246               | 5 672                 | 46,0%                                      |
| <b>Total</b>     | <b>76 320</b> | <b>69,2</b> | <b>41,5%</b>      | <b>6 688</b>        | <b>6 621</b>          | <b>53,6%</b>                               |

*Source: Own estimates based on information provided by Social Security Agency*

22. The distributions by age and gender of the 53 thousand beneficiaries of retirement pensions are shown in Figure 3.

**Figure 3**

**Beneficiaries of retirement pensions by age and sex, Malta 2009**

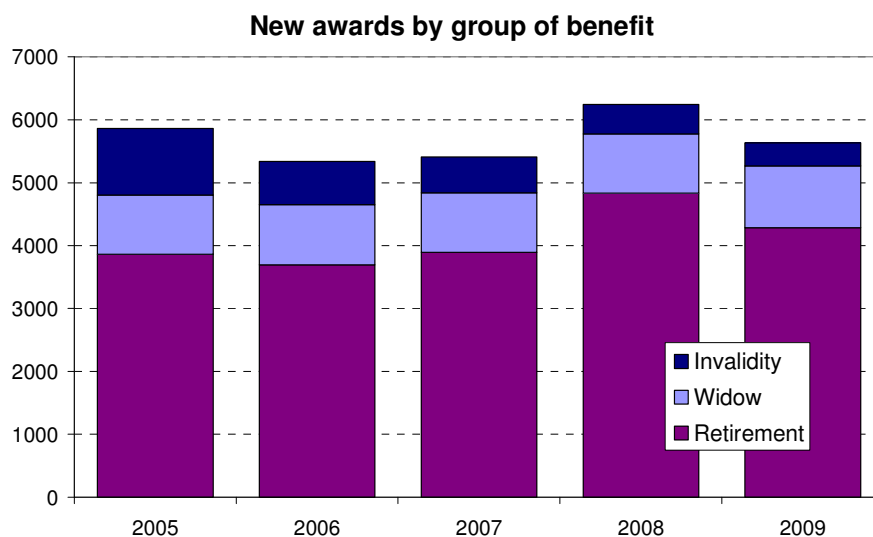


*Source: Own estimates based on information provided by Social Security Agency*

23. Beneficiaries of retirement pensions had an average age of 69.6 years (68.9 for females, 69.9 for males), the mean annual payment was €6,836, and the median annual payment €6,755. The most significant type of benefit is the “2/3 retirement pensions” (which represents 56.7% of total cases), followed by the “retirement pension” (18% of total cases) and the national minimum pension (16% of total cases).

24. From 2005 to 2009, there were 5,698 new beneficiaries (to include retirement pensions, invalidity pensions, and survivorship pensions) each year on average, of which 62% were male. The trend was relatively stable. In 2009, there were 5,633 new awards.

**Figure 4**



*Source: Own estimates based on information provided by Social Security Agency*

25. Retirement pensions from 2005 to 2009 averaged 4,114 annual new awards, of which 73% were male. The trend is growing slightly; in 2009, there were 4,283 awards.
26. Contributions during 2009 totaled to €526 million (67% from employees and employers, 33% from government budget) while total contributory benefits represented 95.5% of contributions (€502 million). The declining surpluses from 2007 to 2009 are shown in Table 3.

**Table 3****Social Security financial flows (current million euros)**

|           | Concept                              | Year       |            |            |
|-----------|--------------------------------------|------------|------------|------------|
|           |                                      | 2007       | 2008       | 2009       |
| 1         | Social Security contributions        | 320        | 340        | 351        |
| 2         | Direct contribution SSA 1987         | 160        | 170        | 175        |
| 3 = 1+2   | <b>Total Revenue (Contributions)</b> | <b>480</b> | <b>510</b> | <b>526</b> |
| 4         | Invalidity                           | 37         | 35         | 32         |
| 5         | Retirement                           | 262        | 294        | 320        |
| 6         | Bonus                                | 29         | 33         | 39         |
| 7         | Widows (Survivorship)                | 90         | 94         | 98         |
| 8         | Short term                           | 13         | 13         | 14         |
| 9         | <b>Total Contributory Benefits</b>   | <b>431</b> | <b>469</b> | <b>502</b> |
| 10 = 3-9  | <b>Current balance</b>               | 49         | 41         | 24         |
| 11 = 10/3 | Relative surplus                     | 10.2%      | 8.0%       | 4.5%       |

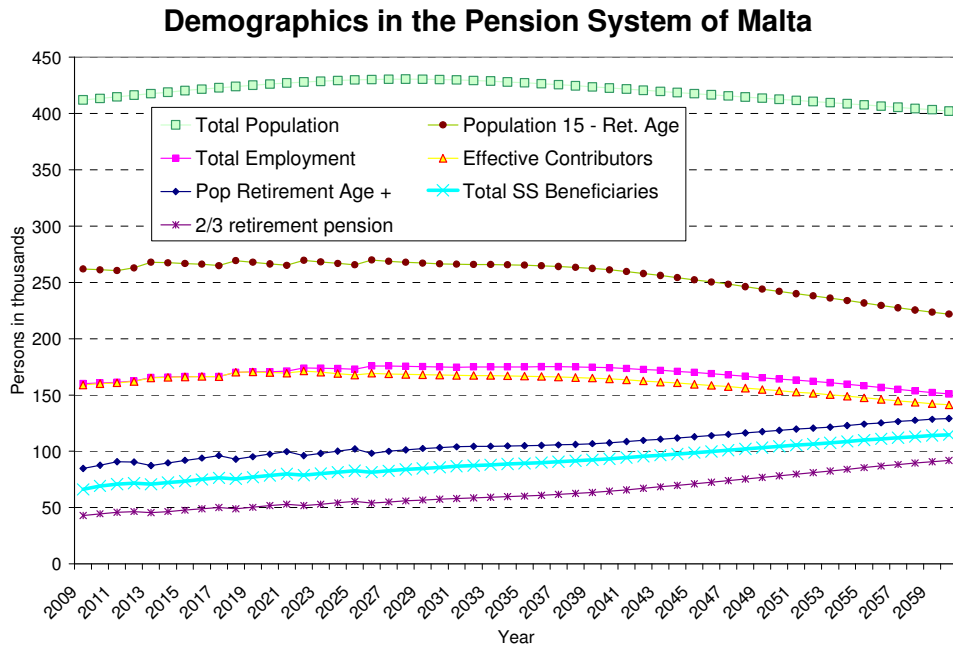
*Source: Own estimates based on information provided by MFEI*

27. The team analyzed all of the line items included in Table 3 but ignored other items that appear related to Social Security to include administration expenses (about €6 million in 2009), health recurrent services (€360 million), noncontributory benefits (€155 million), and pensions paid by MFEI (€86 million).

**Evaluation of demographic trends and an assessment of projected financial flows**

28. The sustainability of any country's social security system depends not only on its current fiscal position but on what can be reasonably expected to happen over the long term. The population of Malta is projected to increase from 412 thousand in 2009 to 430 thousand by 2030 and then to decline to 402 thousand by 2060. The population in "active" ages (defined as age 15 to a varying retirement age) will follow a similar trend: declining from 252 to 222 thousand in 2060. Employment and total contributors were about 160 thousand in 2009 and will follow a similar pattern (but will be slightly more stable) reaching about 151 and 141 thousand, respectively, by 2060.
29. On the other hand, from 2009 to 2060, the population over the retirement age will rise from 85 to 129 thousand, total social security beneficiaries will increase from 66 to 115 thousand, and – most significantly – the number of retirement pensions will grow from 43 to 92 thousand (see Figure 5).

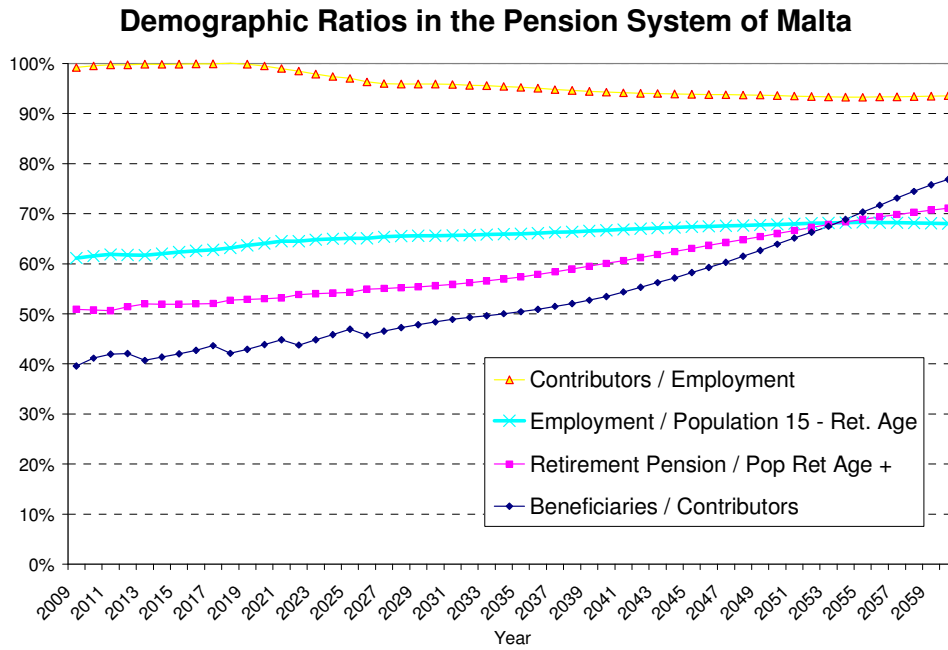
**Figure 5**



Source: Own estimates

30. It is useful to measure these demographic trends not only in absolute values but by using ratios, as well. The team picked four relevant indicators: Employment/Population in Active Ages; Contributors/Employment; Beneficiaries/Contributors; and Retirement Pension/Population above Retirement Age (see Figure 6). Employment represents a growing proportion of the Population in Active Ages (61% in 2009, 68% in 2060) given the assumption of increasing participation of females in the labor force. Contributors represent a diminishing proportion of total Employment (from 99% to 94%) considering that there are some exempt and part-time workers.
31. Beneficiaries represent a growing proportion of (40% in 2009, 77% in 2060), implying that the system dependency ratio declines from 2.5 contributors for each beneficiary to just 1.3 contributors for each beneficiary in 2060. This trend is due to population aging in Malta and also to the increased coverage for the elderly: Retirement Pensions will grow from 51% of the Population above Retirement Age up to 71% in 2060.

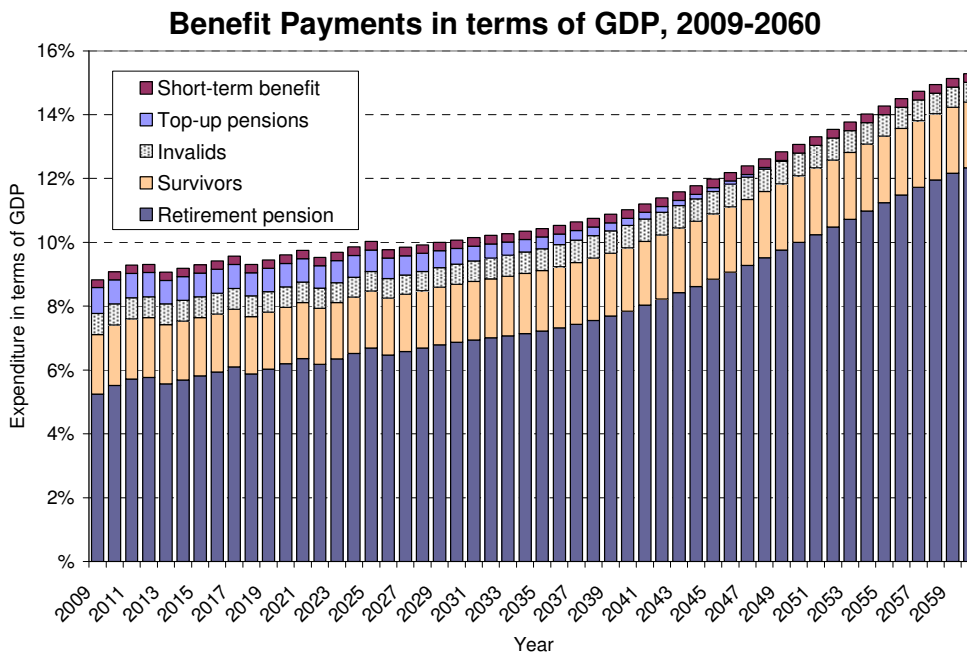
**Figure 6**



Source: Own estimates

32. Demographic trends are significant determinants of projected financial flows for most public pension systems. The increasing number of beneficiaries (together with a rather conservative assumption for GDP growth) in Malta implies a significant growing trend in pension payments (especially for retirement pensions) in terms of GDP, from 8.8% in 2009 to 15.3% by 2060.

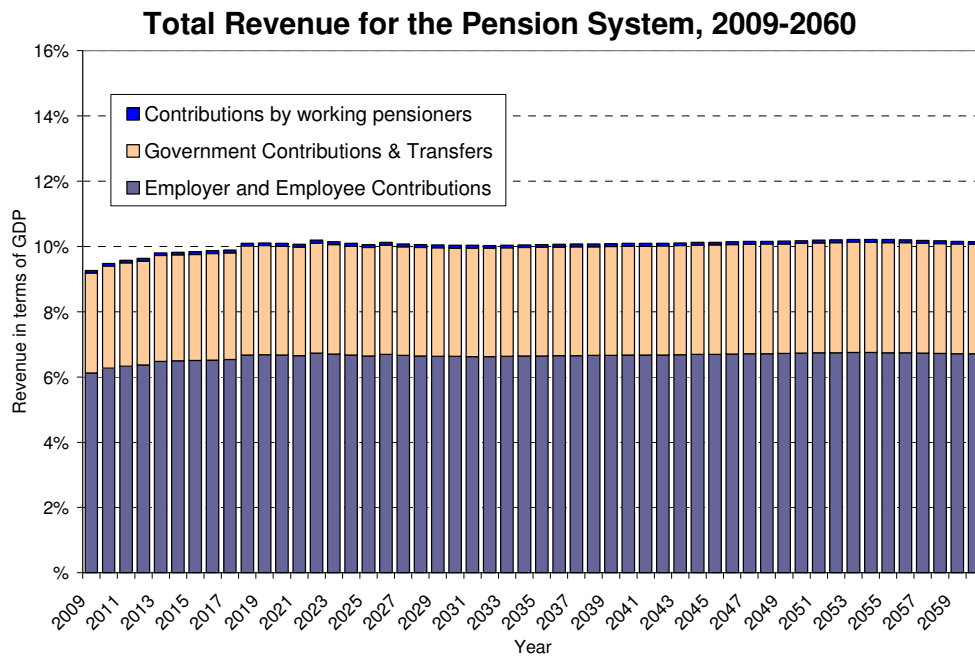
**Figure 7**



Source: Own estimates

33. During 2009, payments of retirement benefits represented about 5.2%, widows 1.9% and invalidity 0.2% for a total of 7.8%. In terms of the insured wage bill, retirement benefits represented about 16.3%, widows 5.8% and invalidity 2.0% for a total close to 24%.
34. Regarding revenue, the more stable evolution of contributors (given population and employment trends) results in a relatively constant trend for projected resources around 10% of GDP.

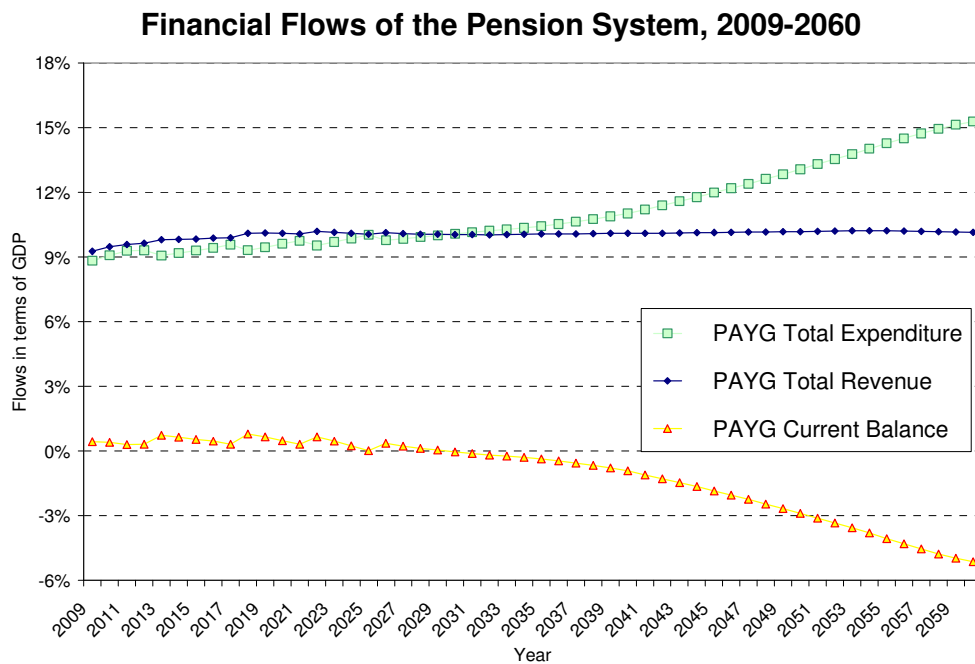
**Figure 8**



*Source: Own estimates*

35. Net cash flows are calculated as the difference between projected revenues and expenses. As is shown in Figure 9, after two decades of hovering close to equilibrium, the pension system will exhibit a growing deficit relative to GDP: below 1% for the decade starting around 2030, between 1% and 3% for the decade starting around 2040, between 3% and 5% during the decade starting around 2050, reaching 5.1% by 2060.

**Figure 9**



*Source: Own estimates*

36. These projections suggest that the pension system in Malta is expected to remain in reasonable equilibrium for the next two decades but the balance will become negative thereafter due to faster increase in expenditures as compared with revenues, resulting in increasing need for public resources. The reforms introduced in recent years have helped in the short and medium terms, but they are not sufficient to assure long term sustainability.
37. The fiscal balance of any pension system is effected by several factors, and there are no easy ways to ensure sustainability. Alternative measures for establishing a more sustainable system include increasing resources by establishing higher ceilings for contributions and/or avoiding non-taxable payments to workers and increasing the proportion/number of contributors by (i) introducing incentives for greater participation by women in the labor force and (ii) establishing penalties for early retirement and/or incentives to remain active, especially as healthy life expectancy increases. The relative impact of these and other alternatives is considered in Part II of this report, including an analysis of the effect of alternative parametric reform scenarios.

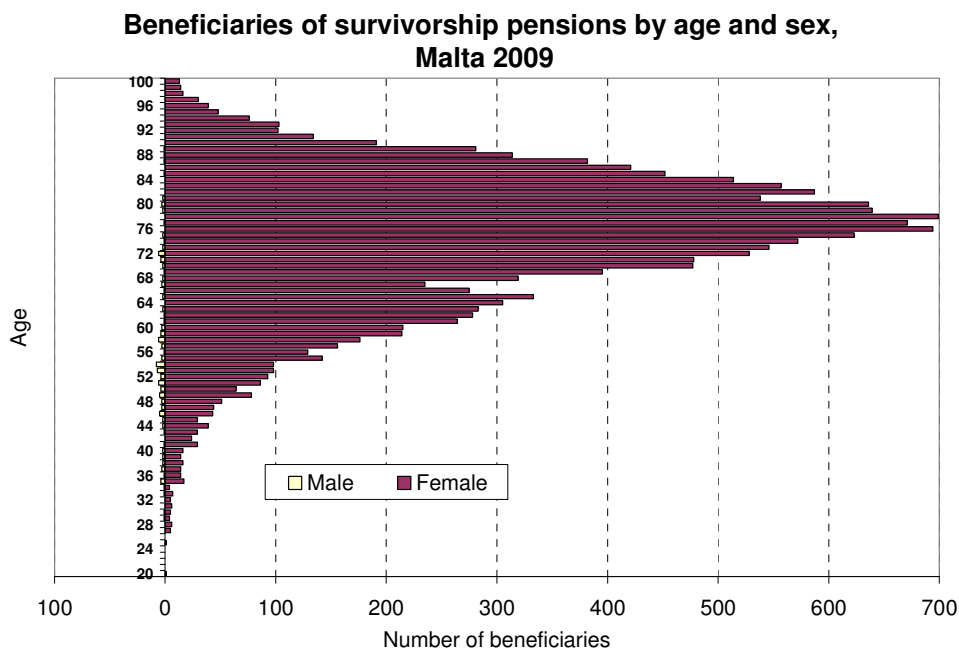
### **Survivorship pensions**

38. The objective of this section is to analyze the available data on survivorship in Malta, the current cost of survivorship pensions, and projected costs under different scenarios.



39. By the end of 2009, there were 16 thousand beneficiaries of survivorship pensions, also referred to as “widows pensions.” The proportion of males was just 0.8%. The distributions by age and gender are shown in Figure 10.

**Figure 10**



*Source: Own estimates based on information provided by Social Security Agency*

40. Beneficiaries of survivorship pensions were 74 years of age on average (74 for females, just 57 for males), the mean annual payment was €6,874, and the median annual payment €6,626. The most significant type of benefit is the “national minimum widow pension” (46.2% of total cases) followed by the “survivorship retirement pension” (37.0% of total cases) and the early survivors pension (13.4% of total cases).
41. From 2005 to 2009, 954 new beneficiaries were awarded survivorship pensions on average each year, with males accounting for 2.1% of this total. The trend is relatively constant; in 2009, there were 985 awards.

**A simplified prospective model**

42. Payments for survivorship pensions are impacted by many time-variant factors such as the legal framework, compositional effects, indexation, theoretical and empirical adjustments. This section of the report will define a basic hypothetical scenario that recognizes all the intervening variables and facilitates an analysis of the different and alternative effects to be presented in separate work.
43. The following variables affect survivorship insurance costs:
- a. Probabilities of dying for the insured population
  - b. Replacement ratio for the defined benefit
  - c. Definition of eligible beneficiaries and their survival probabilities
  - d. Marital status, sex, and age of beneficiaries

- e. Discount rates for likely future payments
  - f. Previous work experience and insured earnings history
44. A simple model can be used to quantify the impact of these factors on insurance costs. Survivorship costs for a given year ( $t$ ) can be decomposed into three components: one is the risk of dying (annual deaths over mid-year population, or annual relative frequency,  $m_t$ ) the second is the proportion of contributors married ( $pm_t$ ), and the third one is the present value of the insured capital. The survivorship insured capital ( $SIC_t$ ) is equivalent to the defined benefit ( $SDB_t$ ):

$$SC_t = m_t * pm_t * SIC_t = m_t * pm_t * SDB_t \quad (1)$$

One of the difficulties to further develop *Equation (1)* is the fact that it depends not only on the period considered, but also on individual ages ( $x$ ), so that the overall survivorship cost, in turn, depends on the age structure of the insured population ( $c_{x;t}$ ), since it is a weighted average of the age-specific costs.

$$SC_t = \sum_x SC_{x;t} * c_{x;t} = \sum_x m_{x;t} * pm_{x;t} * SIC_{x;t} * c_{x;t} \quad (2)$$

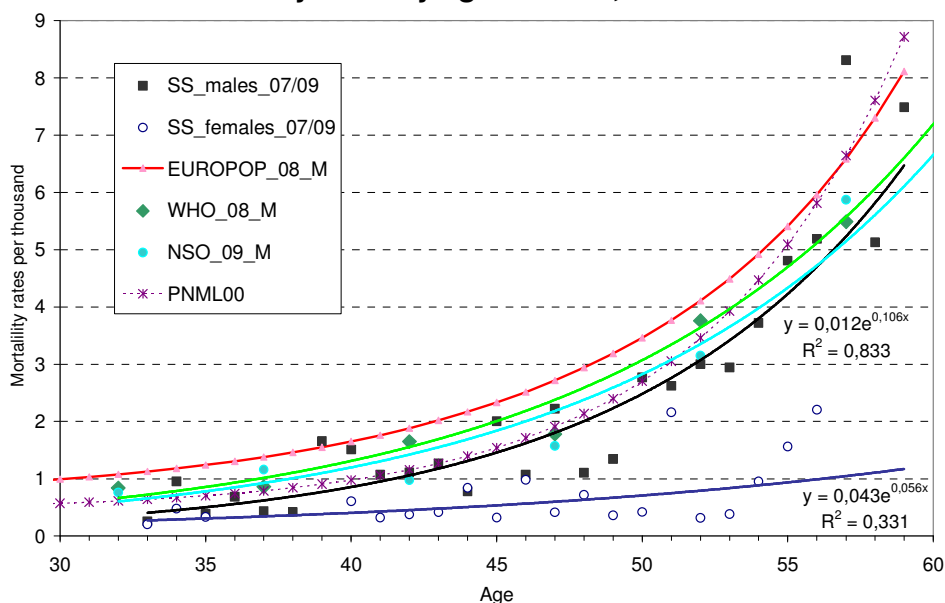
Estimates of individual risks ( $m_{x;t}$ ) were assessed through the available data on new awards for the period 2007 to 2009 provided by the social security system. The age distribution of the insured population was provided by MEF. The estimated age-specific and sex-specific rates show exponential growth, but they still understate mortality risks given that those deaths that do not result in a new benefit are not taken into account. Instead, the team considered alternative estimates for the general population based on estimates prepared by national and international organizations (Figure 11): 2009 mortality rates based on EUROPOP 2008 and prepared by PROST (PEP09); 2009 abridged life table prepared by the National Statistic Office (NSO, 2010); 2008 life table prepared by the World Health Organization (WHO, 2009) and the ‘PNML00’ table that have been used in Malta for the insurance sector.<sup>2</sup>

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<sup>2</sup> The ‘PNML00’ table was selected from a set of “T00” life tables that were produced by the CMI in the UK. See Tables A1 to A3 in the Annex.

**Figure 11**

**Mortality rates by age and sex, Malta 2008**



For the basic hypothetical scenario, the team chose to use probabilities of dying from the PEP09 table for males. As is shown in Table 4, the mortality analysis may be summarized by two indicators: the temporary life expectancy between ages 20 and 60 [ $e(20;40)$ ], and life expectancy at age 60 [ $e(60)$ ].

**Table 4**

**Comparison of mortality indicators by sex and life table**

|                              | Males | Females |
|------------------------------|-------|---------|
| <b><math>e(20;40)</math></b> |       |         |
| PEP09                        | 38,9  | 39,3    |
| PEP60                        | 39,4  | 39,7    |
| PNL00                        | 39,4  | 39,6    |
| WHO08                        | 39,1  | 39,6    |
| <b><math>e(60)</math></b>    |       |         |
| PEP09                        | 19,7  | 23,3    |
| PEP60                        | 25,6  | 29,1    |
| PNL00                        | 21,6  | 24,7    |
| WHO08                        | 21,1  | 24,2    |

The second component – the value of the defined benefit (an annuity with monthly payments) – requires the definition of three factors:

The replacement rate, that is equivalent to a given percentage of the average earnings base, that varies according to the working/contributing history.

The projected length of payment period which varies according to age and sex of beneficiaries and their survival probabilities (life expectancy).

The discount rate to estimate the present value of likely future payments.

For the baseline scenario, the team chose an estimated 50% replacement rate based on final year salary. The team assumed that the proportion married is equivalent to that coming from Census05 and that the length of payments is only a function of spousal survivorship. Survival probabilities for pensioners were unavailable so the cited PEP09 life table (for females) was adopted.<sup>3</sup> Finally, future likely payments are discounted at an annual rate of 3%.<sup>4</sup> The average defined benefit is therefore estimated as:

$$SDB_x = 0.5 * \sum_{t=0}^{\omega-y} {}_t p_y * v^t \quad (3)$$

where:

${}_t p_y$  = spouse's probability of surviving from age  $y$  to age  $y+t$  from the PEP09 life table for females. Age  $y$  is considered to be 3 years less than  $x$ , given the different mean age at marriage by sex (26 years for males and 23 for females, see NSO, 2007).

$v$  = rate of discount =  $1/1.03 = 0.97087$

From the three equations above, one can conclude that the theoretical survivorship cost depends on the following variables: the probabilities of dying; the distribution of the population by marital status; survival probabilities for spouses; the discount rates for likely future payments; the working and earnings histories (that determine the replacement rate); and the age structure of the insured population. Administrative expenses are not considered here.

A hypothetical basic scenario was developed to analyze the different components of the survivorship pensions (SP), under the following assumptions: all males, proportion married (to women 3 years younger) taken from 2005 Census, working ages from 20 to 60, age distribution of the 2009 active contributors taken from PROST projections.

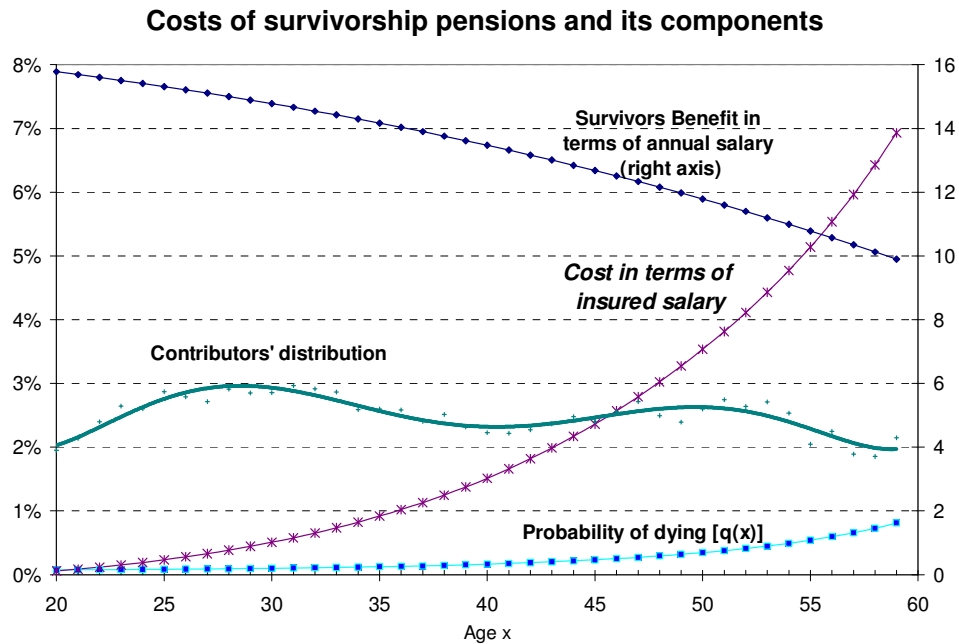
As is shown in Figure 12, the present value of future payments (the survivors benefit in terms of the salary) decreases slowly with age at an annual rate of 1% on average. The proportion of married persons increases almost linearly (graph not shown) from 5% at age 20 to 85% at age 49 and remains almost constant after age 50. On the other hand, the probabilities of dying increase about 18% a year. Thus, the age-specific survivorship costs (obtained by multiplying these probabilities by their associated benefits) increase by 23% per year, emphasizing the relevance of the age composition.

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<sup>3</sup> See Table A4 in the Annex.

<sup>4</sup> The 3% assumption is based on the assumed rate for the medium term economic growth in Malta, although different rates might be used. For a discussion of the rates in Latin American countries (around 4%), see Palacios and Rofman (2001).

**Figure 12**



Source: own elaboration based on Table A5 in the Annex.

While the SP cost is less than 1% for workers aged below 36, it is over 4% of the average salary for those aged above 53. On average (weighted by the age structure of the contributing population in 2009), the defined benefit of SP is equivalent to 12 annual salaries. The gross annual risk of dying is 0.23%, the proportion married is 55%, and the estimated average insurance cost is 1.8% of the insured salary.

As previously noted, these estimates do not reflect ‘real’ costs although, in practice, they can be expected to converge. During 2009, total payments for SP amount to approximately €111 million, or about 6% of total wages, but this figure includes survivorship retirement pensions (SRP). However, leaving aside the SRP, SP amount €55 million, or about 3% of total wages. This figure still seems to be an overestimation of the cost of SP for active ages.

This is a simplified model. The interaction of the intervening variables may produce very different results from those shown here, and the data and assumptions involved might also be biased. However, through this exercise, it is possible to get a better understanding of the relevant components of survivorship costs and a reasonable measurement of their relative impacts.

Considering the aging process already taking place in Malta, to establish the sensitivity of the previous estimates and provide some prospective costs, it is possible to estimate the gross total cost expected for 2060 by modifying (i) the expected risks for active contributors, (ii) the expected survivorship for beneficiaries, (iii) the increasing age of retirement, and (iv) the age structure of contributors.

When the team adopted the PEP60 life table, survivorship pension costs decrease by 25%, down to 1.3% of salaries. While the defined benefit increases on average by just 3%, and the proportion married increases by 12% (due to changes in the age composition), the average mortality risk at active ages decreases by 32%. Put simply: greater longevity is more than compensated for by decreasing mortality for active ages.

A basic case for survivorship pensions was developed for males. Given that females have a lower risk of dying at all ages and that they usually marry older males who will therefore survive for fewer years, the cost of survivorship pensions was estimated to be 0.6% of the wage base; thus, the overall cost of survivorship should be 1.3% (see Table A6 in the Annex), more than doubling the cost of invalidity (to 0.6%). Note, however, that survivorship pension payment is eliminated if the spouse (beneficiary) receives a higher salary or a higher retirement benefit.

The analysis in this section has mainly focused on the determination of the costs of survivorship pensions based on long term considerations. The analysis defined a baseline scenario for the survivorship pensions under current experience and projected rules. Calculations for the baseline were limited by the availability of information, and results could be improved if missing information were to become available.

The results show the importance of specific costing and pricing of survivorship pensions. These benefits represent more than 1% of wages.

While alternative assumptions may produce different results, it is critical to make use of regulatory power to create a sustainable benefits framework. If the government expects to have lower costs for these benefits, replacement ratios and/or covered beneficiaries should be redefined accordingly.

## **INVALIDITY PENSIONS**

45. Pension systems worldwide include a minimum of three major components: old age retirement pensions, survivorship, and invalidity programs. Since the 1980s, old age pensions have been the major driver behind reforms, primarily because of the stress imposed on pension systems by demographic and labor market factors.
46. Invalidity pensions, however, have received comparatively less attention. Problems of low coverage, financial disequilibria or the absence of sustainability, administrative inefficiencies, and poor governance are not necessarily addressed by reforms to old age retirement systems. To a large extent, this is due to the different nature of old age and invalidity pensions.
47. In contrast with old age pensions, “invalidity” is less easily defined on the basis of objective parameters. It relies, to a large extent, on the definitions different countries use to define what it means to be disabled. The cost of invalidity pensions reflects eligibility conditions, benefit formulas, and other factors. These different definitions and criteria make international comparisons more difficult than in the case of old age

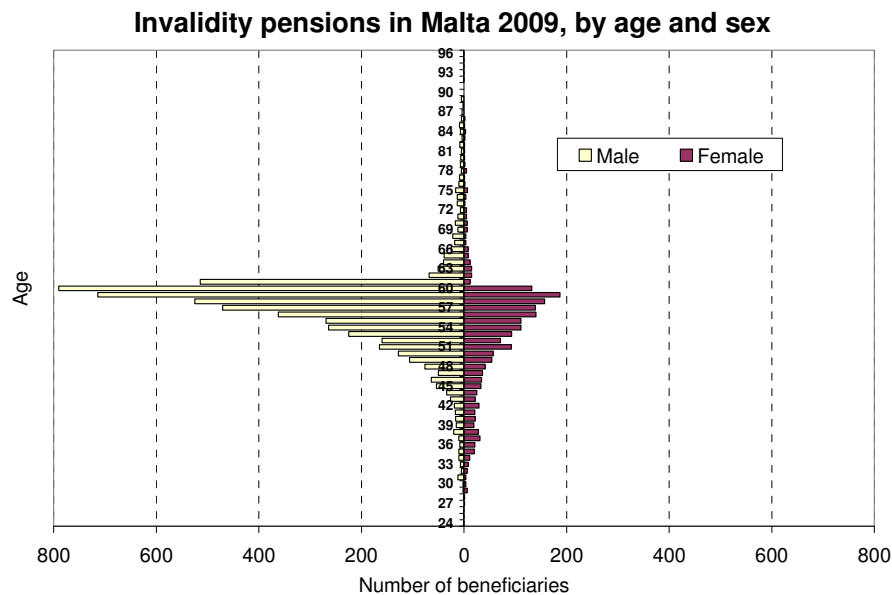
pensions. Costs and coverage, therefore, both show significant variation across countries.

48. In addition, while pension mechanisms tend to focus on the provision of monetary compensation for income loss, invalidity programs are evolving toward a more comprehensive approach that includes rehabilitation of workers as an effective mechanism to prepare disabled workers to return to their jobs. This is another major reason why the scope of policy reform options needs to be broadened to include invalidity pensions in addition to the traditional “retirement income” approach to pension reform.
49. Pension reforms normally address the issues and alternatives to reform old age pensions in detail, but they are usually less explicit on the type of reforms required for survivorship and invalidity pensions. This can result in undesirable effects, such as rapid growth in invalidity pensions when conditions for old age pensions are tightened. This is the reason why an increasing number of countries are considering adopting an integrated approach to reforms in the different risks covered by their social security programs.
50. A comprehensive approach to Social Security reform, including a component on invalidity pension programs, needs to include an analysis of costs, administrative procedures, and institutional and regulatory requirements. Previous quantitative analysis done for the pension system in Malta included an estimate of invalidity and survivorship benefits, but these were estimated based on constant ratios to old age pensions. As part of this technical assistance program, the World Bank has performed an assessment based on the specific parameters that determine unit costs for each type of contingency.
51. This section analyzes the available data on invalidity, the current cost of invalidity pensions (after recent regulation reforms in Malta), and projected costs under different scenarios. Based on the 2005 Census of Population and Housing (NSO, 2007), there were 24 thousand persons with long-term invalidity, of which half were male, and only 10 thousand persons aged between 20 and 60. The total prevalence represents 5.9% of the population. The most frequent types of invalidity were physical impairment (31.4%), followed by visual impairment (17.4%) and “more than one type” (16.6%). For active ages (i.e., persons between 20 and 59), the prevalence rate was 4.4%. The most frequent impairment were physical (29.3%), followed by visual (15.9%), and other (15.9%).
52. Invalidity pensions are payable to persons deemed permanently incapable for suitable full-time or regular part-time employment (i.e., a degree of disablement assessed at 90% or higher), with various rates of payment according to different conditions (MFEI, 2009).
53. The insured must have at least 250 weeks of paid contributions as an employee or as a self-employed person, including an annual average of at least 20 weeks of paid or

credited contributions. The insured must also have been in continuous full-time or regular part-time employment or self-employment for at least 12 months prior to the date of the claim (ISSA, 2010).

54. Invalidity pensions can be classified into four types: (i) national minimum invalidity pension; (ii) invalidity pension; (iii) increased invalidity pension; (iv) decreased national invalidity pension. A medical committee is responsible for assessing the degree of invalidity, and the insured has the right to object it.
55. At the end of 2009, there were seven thousand beneficiaries of invalidity pensions. The proportion of males was 75%, and there was a significant concentration of beneficiaries close to retirement age (55% were age 56 to 61). Their distribution by age and gender is shown in Figure 13.

**Figure 13**



56. Invalidity pensioners were 56 years of age on average (53 for females, 57 for males). The mean annual payment was €5246. The median annual payment €5672. The most significant type of benefit is the National Minimum Invalidity Pension (81.7% of total cases) followed by the Invalidity Pension (14.6% of total cases).
57. Invalidity pensioners were 56 years of age on average (53 for females, 57 for males). The mean annual payment was €5246. The median annual payment €5672. The most significant type of benefit is the National Minimum Invalidity Pension (81.7% of total cases) followed by the Invalidity Pension (14.6% of total cases).
58. Between 2005 and 2009, there were 630 new beneficiaries of invalidity pensions annually on average. The trend is declining; in 2009 there were only 365 new awards (i.e., a reduction of 42%).
59. The Maltese Government has introduced changes to the regime regulating the award of the invalidity pensions and to the review procedure. The new regime was



implemented in 2007 after the necessary legislative and organizational changes were instituted. These measures introduced a new medical review process for this benefit. Included in the measures involved are:<sup>5</sup>

(i) Changes in the application format to include more medical data and further responsibility on the part of the claimant to prove his or her case. No invalidity pension is issued for life, and all awards are subject to regular review every three to four years, when updated medical evidence is requested from the beneficiary.

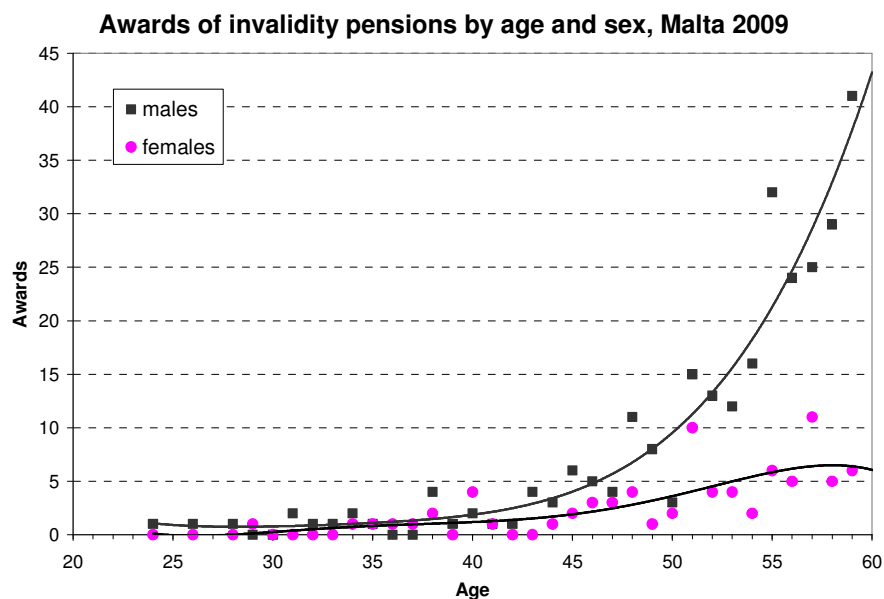
(ii) Changes in the current medical panel system: the Department of Social Security will be recruiting medical practitioners through an expression of interest to act as a medical review team. The team's main function is to advise the Director of Social Security on the medical aspects of invalidity claims.

(iii) The establishment of specific medical criteria for the award of benefits to include "impairment tables" that provide basic guidelines under which the medical review team will evaluate work-related impairment for the award of invalidity pensions.

(iv) The introduction of an independent systems and medical audit for benefit claims that have been awarded or rejected on medical grounds to establish whether such benefits were correctly adjudicated.

60. Changes were also made to the minimum period of sickness prior to the payment of invalidity pension benefits which is now set at three months. This waiting period, however, does not apply to suddenly severe invalidity or terminally ill persons.
61. Given the decreasing trend and the legal changes discussed above, the analysis which follows is restricted to the 365 new awards in 2009. There was a clear majority of males (78%). The distributions by sex and gender are shown in Figure 14.

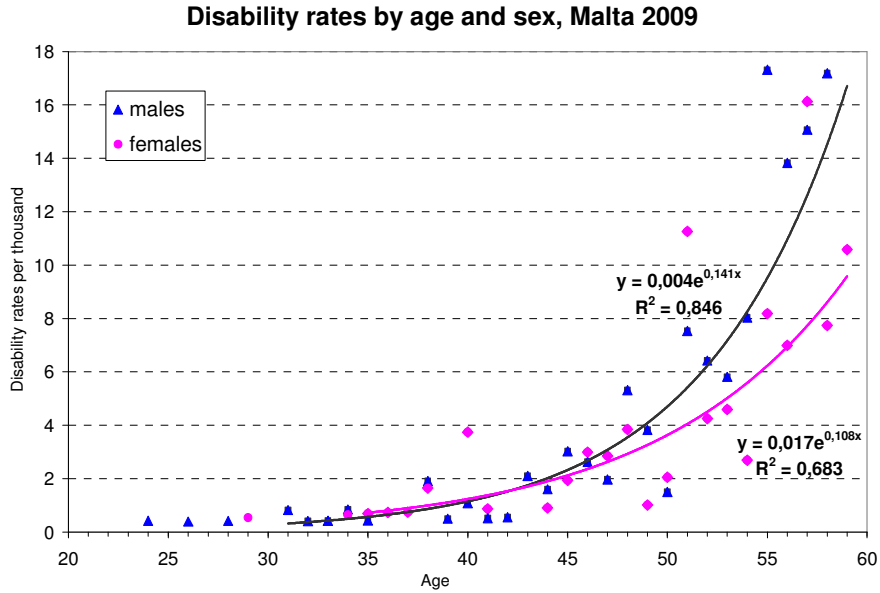
**Figure 14**



<sup>5</sup> MFEI (2009).

62. Combining the new cases with the 159 thousand active contributors estimated for 2009 generates a gross invalidity rate of 2.3 per thousand (2.8 for males and 1.4 for females). Note, however, that age-specific invalidity rates ( $i_x$ ) were higher for females for ages 35 to 50, as is shown in Figure 15. Invalidity rates tend to grow exponentially with age.

Figure 15



63. Invalidity costs at any age  $x$  can be decomposed into two components: one is the risk of becoming disabled (annual relative frequency of new awards,  $i_x$ ); the second is the present value of the defined benefit ( $IDB_x$ ) and their relative wages ( $W/W_x$ ).
64. Invalidity costs at any age  $x$  can be decomposed into two components: one is the risk of becoming disabled (annual relative frequency of new awards,  $i_x$ ); the second is the present value of the defined benefit ( $IDB_x$ ) and their relative wages ( $W/W_x$ ):

$$IC_x = i_x * IDB_x * \frac{W}{W_x} \quad (4)$$

65. In any period, gross costs depend not only on the age-specific components included in Equation (1) but also on the weight of contributor's age distribution ( $c_{x,t}$ ), so that:

$$IC_t = \sum_x IC_{x,t} * c_{x,t} = \sum_x i_{x,t} * IDB_{x,t} * \frac{W_x}{W} * c_{x,t} \quad (5)$$

66. Estimates of individual risks ( $i_{x,t}$ ) were assessed through the data provided by the Social Security Agency for 2009 and the smoothed age- and sex-specific invalidity rates previously estimated.

67. It would be useful to compare the team’s estimates of invalidity rates by age with different experiences and/or tables used by other countries, but there are difficulties with such comparisons. There are varying definitions (partial or total, permanent or temporary, etc.) and there are few publications that include measurements of risks by age. Besides, the risks are also effected by different levels of selectivity of the exposed population (Grushka et al., 2010). With these caveats having been stated, the comparison is important to discern whether the rates of invalidity by age estimated for Malta (for men) follow a reasonable pattern based on international experience. The experiences considered included the following

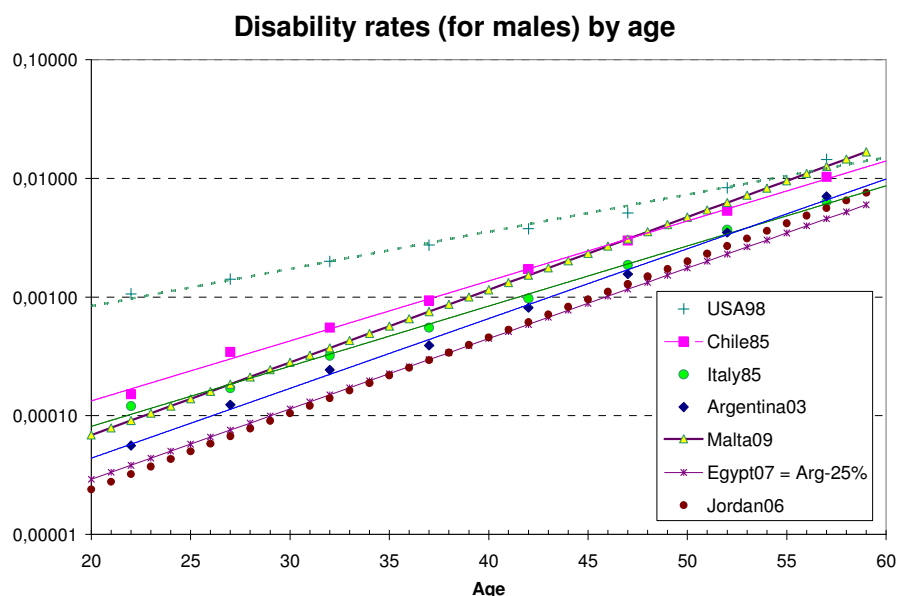
Italy85: Table prepared by the National Social Security Institute (INPS), reflecting the experience of commercial employees who participated in the mandatory national system during 1984-86 (Coppini, 2000).

USA98: Rates estimated by Zayatz (1999) based on the experience of the social security system (OASDI) in 1998.

68. Figure 16 shows these invalidity rates by age. The patterns tend to be similar. Rates are slightly lower in Malta (especially before the age of 45) than those in USA, although slightly higher than in Italy. While Italy85 overlap with those of Malta indicating similar levels, USA98 show strikingly high rates at younger ages, reducing the relative gap at advanced ages.

69. Higher levels do not necessarily imply greater risks in the total population, since the selectivity of those exposed can have significant effects.

**Figure 16**



70. Estimated rates in Malta grow exponentially with age at a somewhat higher rate than in the other experiences available. As new data become available, it will be possible to estimate the real risks, taking into account the different definitions of coverage,

qualifying conditions, and rehabilitation treatments. Invalidation insurance costs are effected not only by the probabilities of becoming disabled but also by the insured capital that, in turn, depends on the survival probabilities for disabled workers, the replacement rates, and the relative wages.

71. The defined benefit is a temporary annuity (until the age of retirement) with monthly payments equivalent to a fixed amount. This differs from several other countries where a lifetime annuity is granted based on a given percentage of individual earnings. The value of the defined benefit depends on projected life expectancy (which varies according to sex and age) and the discount rate. Since age-specific death rates were unavailable, the survival probabilities for disabled workers were estimated based on the increased mortality experience of other European countries (Gjesdal et al., 2007) and from the life table approved by the Chilean ‘Superintendencia de AFP’ (‘MI85’). Although there are very few studies for middle income countries, mortality rates for invalidity pensioners also grow exponentially with age. Future likely payments are discounted at an annual rate of 3%.
72. Taking into account that invalidity pensions are mostly flat amounts that represent 45% of the average insured wage and the fact that flat amounts imply a proportional inverse correlation with growing salaries, the team chose to use a fixed replacement rate of 45% modified by the relative wages ( $W/W_x$ ).
73. In case of death of a invalidity pensioner, eligible beneficiaries often have the right to a benefit equivalent to the total or some fraction of such pension. However, the impact of these costs is not considered here because they are analyzed together with survivorship pensions. Thus, the total defined benefit for the basic scenario is:

$$IDB_x = 0.45 * \frac{W}{W_x} * \left( \sum_{t=0}^{60-x} {}_t p_x^i * v^t \right) \quad (6)$$

where:

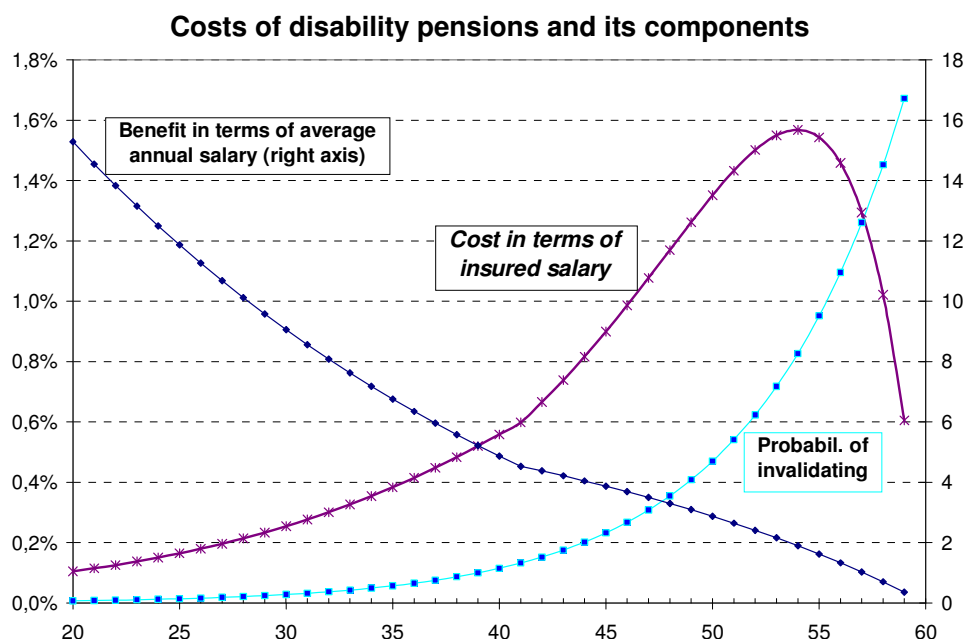
${}_t p_x^i$  = probability of surviving from age  $x$  to age 60 according to the MI85 Life Table

$v$  = discount rate =  $1/1.03 = 0.97087$

74. From *Equations (4) to (6)*, it was shown that the theoretical invalidity cost for a given age depends on the probabilities of becoming disabled, the average replacement rate (and their relative wages), and the survival probabilities of disabled workers. The overall cost depends also on the age structure of the insured population because it is a weighted average of the age-specific costs.
75. To analyze the different components of invalidity cost, a hypothetical baseline scenario was developed and alternatives will be discussed that involve modifying the assumptions one at a time.
76. As is shown in Figure 17, the cost of future payments for invalidity benefits decreases slowly, on average at an annual rate of 3%. The probabilities of becoming disabled increase very fast (at 15% a year) and, thus, the age-specific insurance cost (obtained

by multiplying these probabilities by insured capital) also increases very fast (at 8% a year until age 55). While the cost is less than 0.5% of salaries for workers aged below 38, it is higher than 1% for those aged above 47, underscoring once again the relevance of age composition.

**Figure 17**



Source: own elaboration based on Table A7 in the Annex.

77. On average (weighted by the age structure of the contributor population in 2009), an invalidity pension represents a total cost of seven annual average salaries, the gross annual risk of becoming disabled is 0.3 per thousand, and the cost is 0.64% of the salary (see Table A7 in the Annex).
78. As previously noted, these estimates do not reflect the 'real' costs, although they are expected to converge in practice. During 2009, total payments for invalidity pensions amount to approximately €39 million, or about 2% of total wages.
79. To calibrate the sensitivity of these estimates and to provide some prospective costs, it is possible to estimate the gross total cost by only modifying the age structure of contributors. Considering the aging process already taking place in Malta and the increasing age of retirement, the team chose a more mature system (such as the one expected for 2060) to compare, and the new cost would grow 94%, up to 1.25% of salaries.
80. The analysis in this section was focused mainly on the determinants of the costs of invalidity pensions based on long term considerations. The analysis defined a baseline scenario under current experience. Calculations for the baseline were limited by the

availability of information, and results could be improved if missing information were to become available.

81. The results show the importance of specific costing and pricing of invalidity pensions. In the baseline case, invalidity pensions exhibit a comparatively low cost. While administrative or regulatory reforms may result in some savings for this subcomponent of the pension system, the impact of reforms on the system's finances will not be significant in the short term. However, the situation may be different in the future associated with changes of covered population structure; this will require additional efforts to monitor the financial situation of this program. The financing of invalidity pensions will show a decreasing trend if the 2009 rates (after restrictive reforms were imposed) are held constant over the long term. While different assumptions would yield different results, it is critical for the government to make use of its regulatory power to maintain a sustainable framework.

## **Annex to Part I:**

### **Modeling pensions with PROST<sup>6</sup>**

Pension modeling assesses schemes' fiscal sustainability, which is an essential pre-requisite for achieving other policy goals, such as reducing poverty among the old. It can also assess different reforms, informing both policy-makers and the public about the consequences of change.

The World Bank's pension reform options simulation toolkit (PROST) models pension contributions, entitlements, system revenues and system expenditures over a long time frame. The model is designed to promote informed policy-making, bridging the gap between quantitative and qualitative analysis of pension regimes.

PROST is designed to answer the following kinds of question:

- ❑ How much will the pension system cost in the future? Is it viable and sustainable?
- ❑ What kind of benefits can people expect to receive in the future?
- ❑ Is the pension system equitable? Does it provide a decent retirement income to different categories of people?
- ❑ How large are the government's implicit pension liabilities?
- ❑ How would broadening coverage, changing eligibility, changing benefits, or adjusting contribution rates affect the system? How will costs, expenditures and liabilities change under various reforms?

The model takes country specific data provided by the user. It generates population projections, which, combined with economic assumptions, are used to forecast future numbers of contributors and beneficiaries. These in turn generate flows of revenues and expenditures. The model then projects fiscal balances, taking account of any partial pre-funding of liabilities.

#### **PROST estimates for the baseline scenario**

##### **Demographics**

82. The simulations rely on the mortality and fertility and migration assumptions of EUROPOP 2008. According to these data, the base year fertility is low at 1.39 births per woman of reproductive age and is assumed to grow to about 1.55 births per woman by the end of the modeling period. The mortality rates are assumed to decrease over time in line with observed international trends.
83. Based on these assumptions, the population of Malta is projected to decline from 412 thousand in 2009 to about 402 thousand by 2060, with male life expectancy at birth

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<sup>6</sup> Adapted from World Bank (2010).

increasing from 75.7 to 83.6 years and female life expectancy increasing from 80.6 to 87.8 years as shown in Table 5.

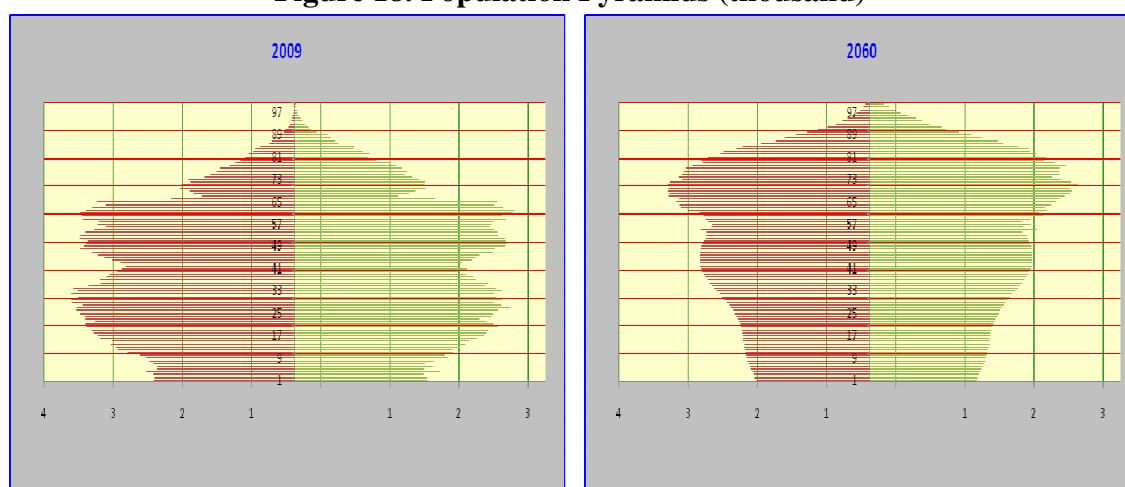
**Table 5. Life Expectancy**

|               | 2009 | 2015 | 2025 | 2035 | 2045 | 2060 |
|---------------|------|------|------|------|------|------|
| <i>Male</i>   |      |      |      |      |      |      |
| At Birth      | 75.7 | 76.8 | 78.5 | 80.1 | 81.6 | 83.6 |
| At Age 65     | 15.7 | 16.4 | 17.5 | 18.6 | 19.6 | 21.1 |
| At Retirement | 18.9 | 18.8 | 18.3 | 18.6 | 19.6 | 21.1 |
| <i>Female</i> |      |      |      |      |      |      |
| At Birth      | 80.6 | 81.6 | 83.2 | 84.6 | 85.9 | 87.8 |
| At Age 65     | 18.9 | 19.6 | 20.8 | 21.9 | 22.9 | 24.4 |
| At Retirement | 23.2 | 22.2 | 21.7 | 21.9 | 22.9 | 24.4 |

*Source:*

84. Despite rising fertility, the increase in longevity will shift the structure of population towards older population cohorts (see Figure 18), resulting in old age population dependency rate of about 50 people of pension age per 100 population of working age by 2051.

**Figure 18. Population Pyramids (thousand)**



*Source: World Bank*

### **Macroeconomic Assumptions**

85. For the short run (i.e., until 2013), the modeling relies on the IMF (WEO, 2010) macroeconomic projections for GDP growth and inflation; after that, it uses the Aging Working Group assumptions for the 2009 budgetary projection (MFEI, 2009). It is assumed that in the post crisis period, real GDP growth rates will increase to 2.7% by 2015 and then converge to 1% by the end of the simulation period. The rate of inflation is assumed to converge to a long run average 2% as is shown in Table 6.



86. It is further assumed that while the population declines, the wage bill will remain approximately constant as a percentage of GDP. The real wage growth rates are derived from projected GDP using this assumption. The social security contributions in Malta are levied on the base wage, which in 2009 was estimated for a full time equivalent contributor to be 13.7 thousand per year.

**Table 6. Macroeconomic Assumptions**

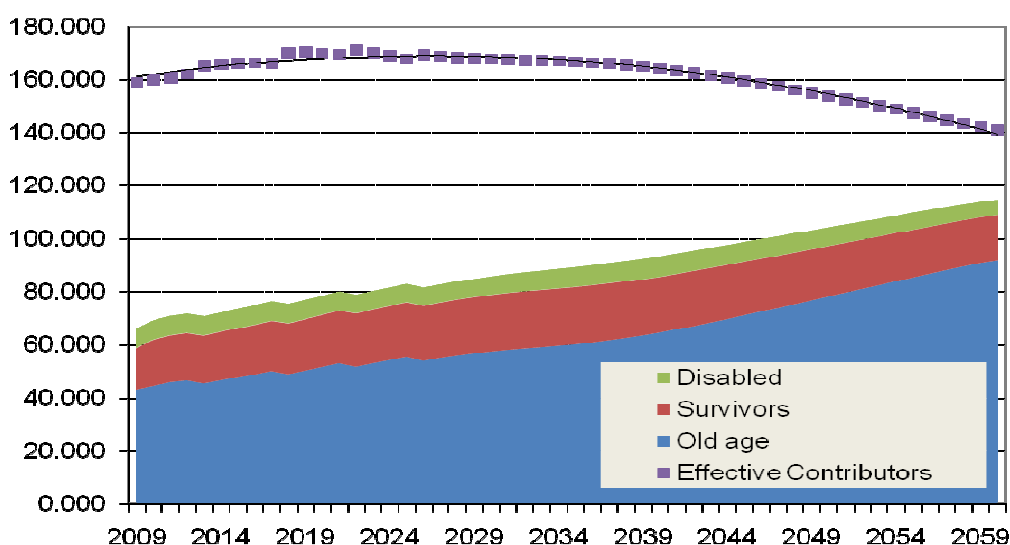
|                         | 2009        | 2010        | 2011        | 2012        | 2013        | 2015        | 2030        | 2045        | 2060        |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                         | -           |             |             |             |             |             |             |             |             |
| <b>Real GDP growth</b>  | <b>1.9%</b> | <b>0.5%</b> | <b>1.5%</b> | <b>2.5%</b> | <b>2.6%</b> | <b>2.7%</b> | <b>1.7%</b> | <b>1.0%</b> | <b>1.0%</b> |
| <b>Inflation</b>        | <b>2.2%</b> | <b>1.8%</b> | <b>2.1%</b> | <b>2.1%</b> | <b>2.1%</b> | <b>2.0%</b> | <b>2.0%</b> | <b>2.0%</b> | <b>2.0%</b> |
| <b>Real wage growth</b> | <b>1.9%</b> | <b>2.1%</b> | <b>2.1%</b> | <b>2.3%</b> | <b>2.5%</b> | <b>2.6%</b> | <b>1.8%</b> | <b>1.7%</b> | <b>1.7%</b> |

*Source: own calculations based on IMF database (WEO, 2010) and AWG assumptions (MFEI, 2009)*

### System Participants

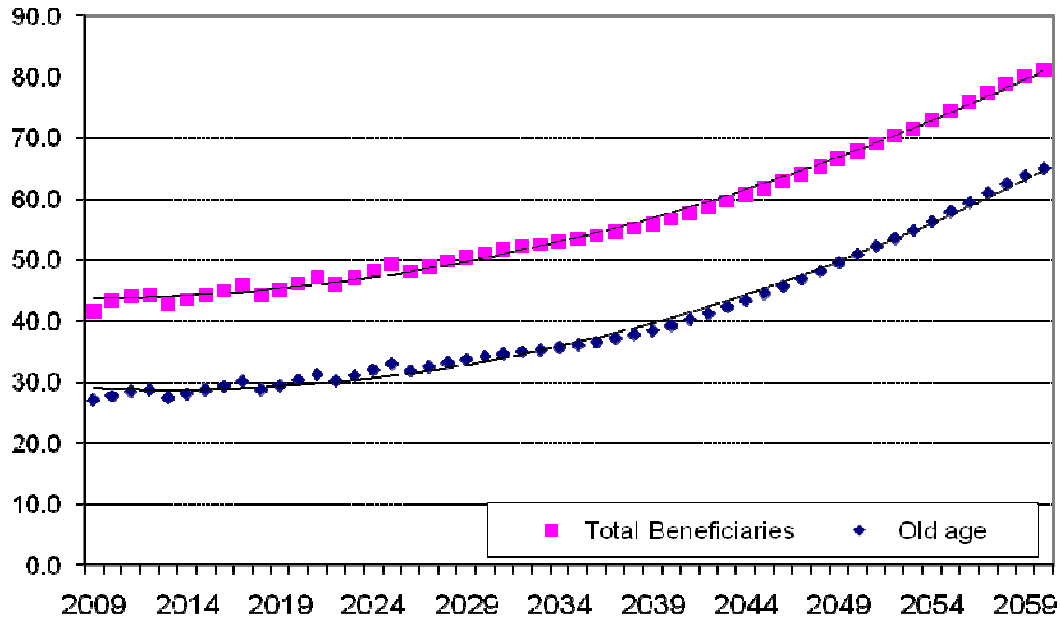
87. The projection of participation was based on individual level administrative records for 2009. Initially, the number of effective contributors is expected to grow due to increases in population, employment, and the retirement ages (Figure 19). Then, as the working age population declines, the number of contributors will fall as well. The numbers of disabled and survivors are assumed to remain constant as a proportion of the population (World Bank, 2010). At the same time, increasing longevity and population aging will drive growth in the number of old age pensioners. By 2050, the total effective system dependency rate will reach 70%, as is shown in Figure 20. This implies that there will be more than one beneficiary per one contributor.

**Figure 19. Pension System Participants**



*Source: World Bank*

**Figure 20. Effective System Dependency Rate**



Source: Own estimates.

**Description of the pension system and modeling assumptions**

88. The first pillar pension scheme in Malta is a conventional PAYG scheme. According to the administrative data for 2009, the average annual number of full time equivalent contributors below the retirement age was about 160 thousand or almost 100% of the employed population. The total number of old age pensioners in 2009 was 43 thousand, 7.5 thousand received invalidity pensions, and there were 15.5 thousand survivors (in addition, about 10 thousand persons received top-up pensions). The ratio of beneficiaries and contributors below retirement age in the base year is around 41.6% – a ratio which will worsen in the future as the population ages.

**Finances of the pension system**

89. The team modeled the statutory contribution rate of 30%, of which equal shares are paid by employees, employers, and the government. The contribution rate is applied to the base wage (not to full earnings) up to a contribution ceiling (which stood at 17,115 in 2009).

90. With regard to expenditures, in the baseline scenario, the team modeled the provisions stipulated by the Social Security reform law of December, 2006. Pensions for new old age pensioners in Malta are calculated according to a benefit formula which specifies the legal retirement age and takes into consideration length of service and the wages

earned over a specified reference period. According to the law, the retirement age will gradually increase from current values of 61 years for males and 60 years for females to 65 years by 2026. The length of service required to earn the full old age pension (i.e., two-thirds of pension assessment base) will increase by 2026 to 40 years, and the length of the reference period for the pension assessment base calculation will increase in 2026 to the best 10 years over the last 40 years. The above policy measures are incorporated into the baseline and all reform scenarios. The pension assessment base (PAB) in Malta is computed using the base wage valorized to 80% of the inflation rate. The latter provision is also included into the baseline and all (but one) of the reform scenarios. In the reform scenario that does not include the base wage, the team simulated switching to full earnings instead of the base wage.

91. Pensions in payment are indexed. The indexation provisions of the Social Security reform law are implemented only in the baseline scenario. It will be shown in the subsequent section that the baseline scenario is, in many respects, functionally equivalent to a no-reform scenario with simplified indexation rules whereby the minimum wage and contribution ceiling are indexed 100% to wages while pensions and the statutory minimum and maximum pensions are indexed 60% to wages and 40% to prices.

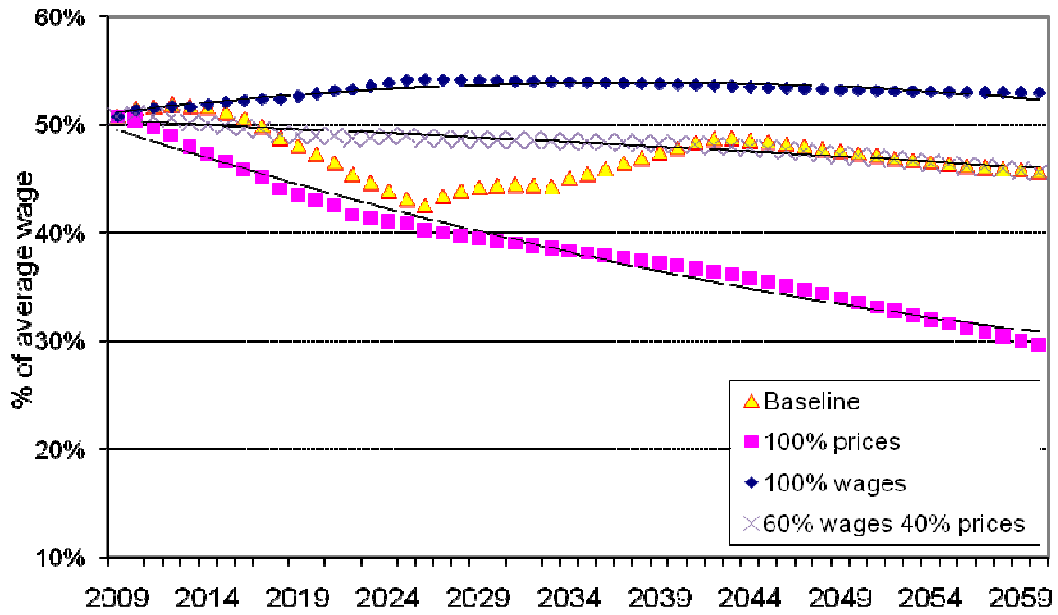
#### **Projections for the base case and no-reform scenario**

92. In this section, several indexation scenarios are developed and compared to the baseline by showing the resulting projected average old-age replacement rates, PAYG balance, and implicit pension debt (IPD). In all scenarios but the baseline, the minimum wage and contribution ceiling are indexed 100% to wages while pensions, the minimum pension, and the maximum pension are indexed as follows:

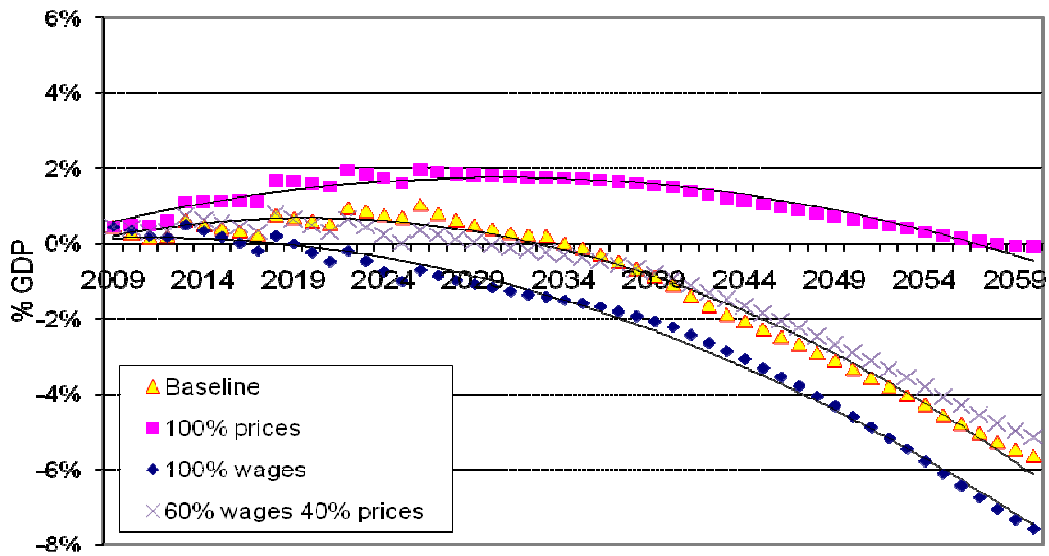
- Scenario 1: 100% to wages;
- Scenario 2: 100% to prices;
- Scenario 3: 60% to wages and 40% to prices.

The results are presented in Figures 21, 22 and 23 below.

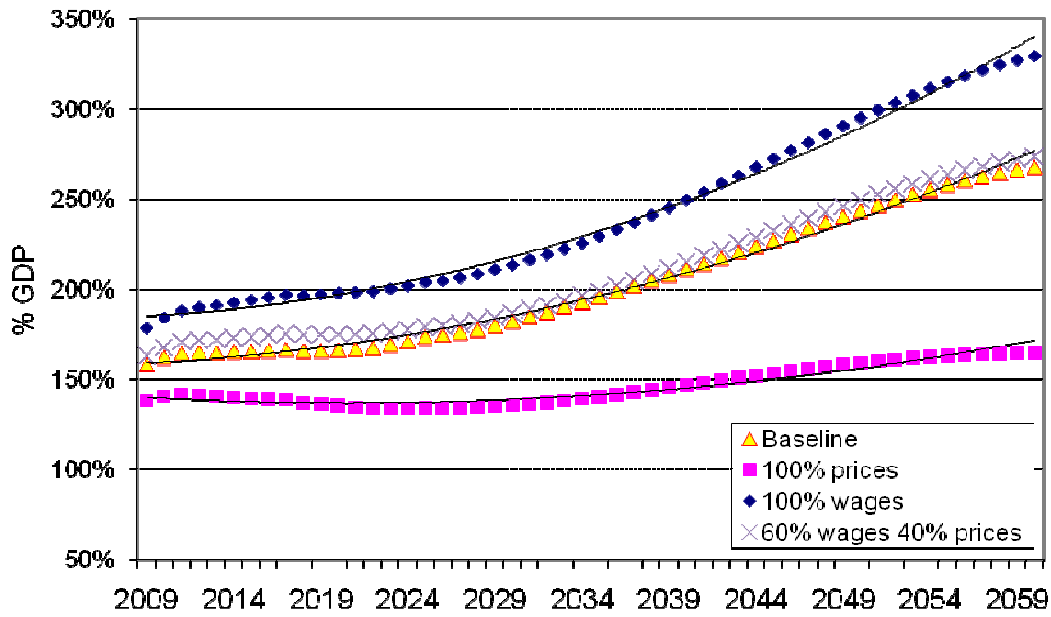
**Figure 21. Average Replacement Rate**



**Figure 22. PAYG Balance, % of GDP**



**Figure 23. Implicit Pension Debt, % of GDP**



Source: World Bank

93. Before 2026, the average replacement rate in the baseline scenario approaches the 100% price indexation. Then, until 2040 it grows at a rate higher than wages. And over the long run, the baseline is practically identical to the 60%/40% wage/price indexation on all three measures: the replacement rate and the balance and IPD. In the next section, the team considers the effects of five types of intervention. To appreciate more easily the potential of each reform, the team measured them against the no-reform scenario that utilizes 60%/40% wage/price indexation.

## **PART II: IMPROVING SUSTAINABILITY OF THE CURRENT PENSION SCHEME: ALTERNATIVE SCENARIOS**

94. This section analyzes reform scenarios to improve the sustainability of the Maltese first pillar pension system. Financial projections for the pension system of Malta were carried out using the World Bank's PROST model. The modeling exercise covers the period from 2009 to 2060 and considers the following benefits paid from the existing PAYGO system: (i) old-age (two-thirds) pensions, (ii) invalidity pensions, and (iii) survivor pensions. The two other types of benefits covered by the contributory pension system, including top-up pensions and short-term benefits, were accounted for and updated in the model using recent data and results of the previous round of projections (MFEI, 2009).
95. The analysis of pension reform options in Malta extensively relied on quantitative results and projections produced using the World Bank's PROST model. Based on normal demographic, labor market, macroeconomic and behavioral assumptions, the model projects the evolution of revenues and expenditures over an extended timeframe to adequately capture the "long term." PROST projections are used to predict the long term financial situation of the pension system and also the effects of changes in parameters. One useful application is the analysis and implication of different reform scenarios. PROST projections were produced for Malta beginning with the 2003 studies. Later updates were performed as the reform discussion evolved.
96. Changes in the basic parameters of the model required reviewing prior projections. The last update was produced in 2007, and staff from the Ministry of Finance (Economic Policy division) were trained in the use of the tool. However, two factors required updating the projections. One is the integration of Malta in the European Union (EU) which required a revision of key macroeconomic indicators. More recently, the IMF reviewed macroeconomic and labor market projections to incorporate the expected impact of the global financial crisis.
97. The projections presented below are based on the data and description of the current pension system provided by government agencies in Malta. Initially, the simulations were conducted for the baseline scenario incorporating the latest changes to the pension system mandated by the reform law of December, 2006. Then, the effects of several additional reform measures – which improve financial sustainability or adequacy of the pension system – were evaluated against the baseline scenario.

### **Projections for alternative parametric reform scenarios**

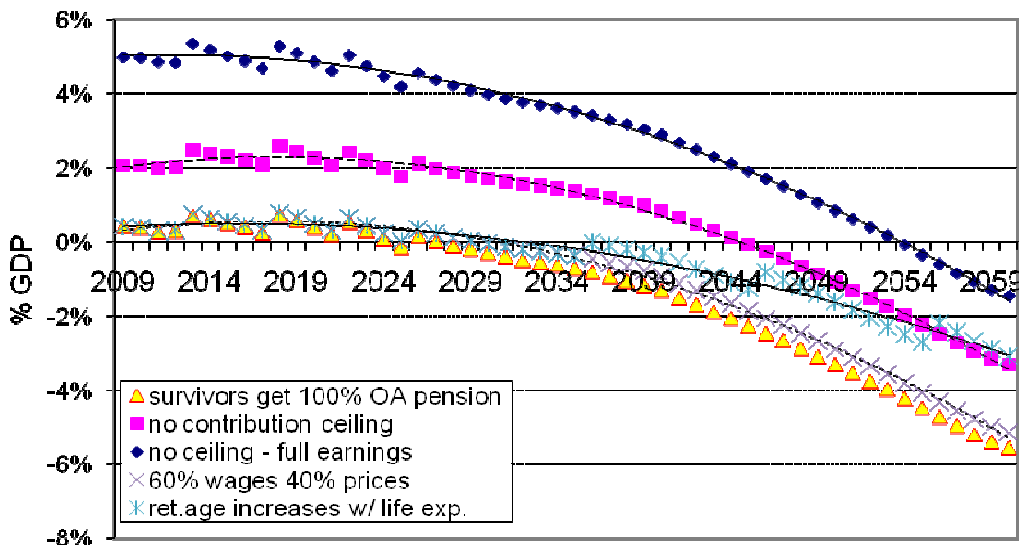
98. To illustrate of what could be accomplished by parametric reforms, PROST was used to project the cash flows of the pension scheme and its implicit pension debt under

four types of interventions. These interventions involve changing one or more pension system parameters and are added on top of the no-reform scenario (with 60%/40% wage/price indexation). The following scenarios were analyzed:

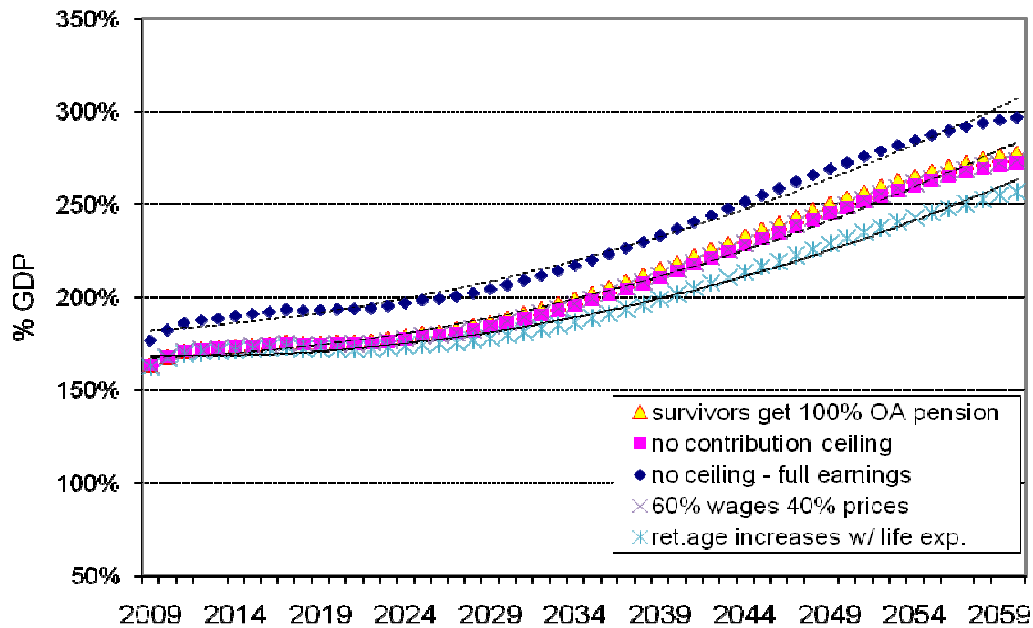
- a. *Reform 1*: Survivorship pension is increased to 100% of old-age pension.
- b. *Reform 2*: The ceiling on contributions is removed.
- c. *Reform 3*: Contributions and the pension assessment base are computed using the full time equivalent earnings without fringe benefits instead of the base wage. In addition, the ceiling on contributions is removed.
- d. *Reform 4*: After year 2026, when the retirement age reaches 65 years for both males and females, the retirement age is further increased in line with rising life expectancy. On average, life expectancy is projected to grow by one year every ten years. Therefore, the retirement age was assumed to increase by one year to 66 years in 2036, to 67 years in 2046, and to 68 years in 2056.

The effects of these reforms are presented in Figures 24 and 25.

**Figure 24. PAYG Balance, % of GDP**



**Figure 25. Implicit Pension Debt, % of GDP**

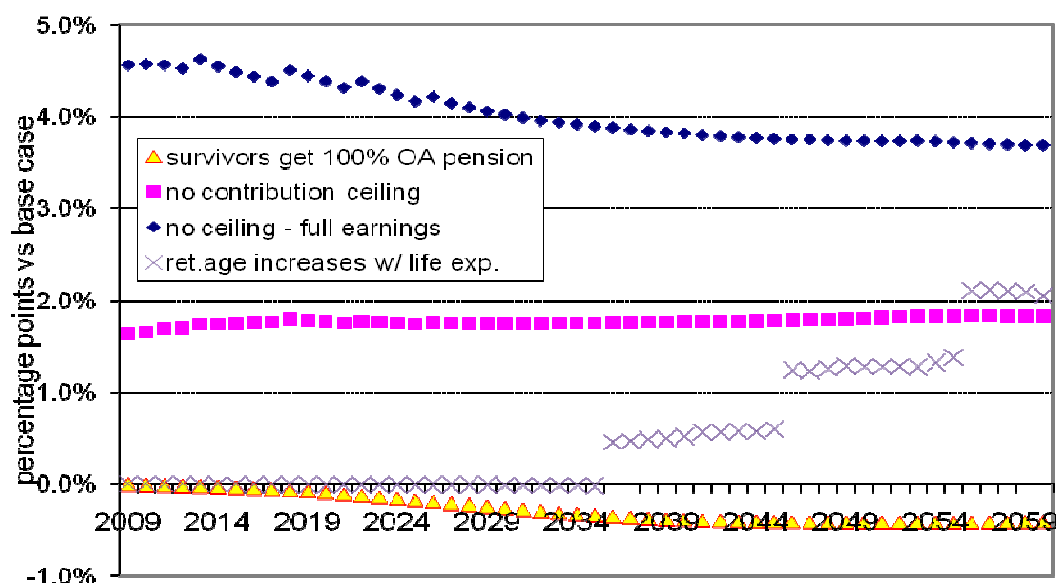


Source: World Bank

99. The scenario under which survivorship pensions are 100% of the old age pension is the most expensive of all the options. The system will start running deficits shortly after the last increase in retirement age between 2026 and 2030. As aging worsens the dependency rate, the current deficit under this option – and under the no-reform scenario – will increase to about 5.0-5.5% of GDP by 2060. Further increases in retirement age in line with life expectancy will help to alleviate this problem, reducing the PAYG deficit to about 3% of GDP by the end of simulation period. Finally, the two options that increase the contribution base – i.e., eliminating the ceiling and switching to full earnings – have the most profound effect on the system’s finances. Under these options, the system will run surpluses until 2045 and 2054 correspondingly. The switch to full earnings will boost the IPD, since the system also promises higher pensions. On the other hand, increasing retirement age will reduce the IPD due to a lower number of recipients.
100. The measures discussed above do not exhaust the possibilities for reform. The most plausible reform proposal would possibly include a combination of measures perhaps in combination with a reduction in the contribution rate to boost economic growth. Figure 26, below, illustrates the relative magnitude and direction of these policy interventions vis-à-vis the no-reform scenario. For example, equalizing survivor and old-age pensions would add about 0.5% of GDP to the deficit of the pension system in the long run. On the other hand, eliminating the contribution ceiling and retirement age increases would reduce the deficit.



**Figure 26. Change in PAYG Balance, % of GDP**



Source: World Bank

### Reforming the financing mechanisms of the first pillar

101. An alternative that the Maltese government might consider is to replace the current defined benefit first pillar scheme with a notional defined contribution (NDC) scheme. Like funded defined contribution (FDC) schemes, NDCs impose a clear link between contributions and pensions, but the main difference with the FDC is that future pensions are not determined by real funds but by a promise from the government to pay on the basis of explicit and objective rules. “NDCs ‘mirror the philosophy’ of a funded system of individual accounts, but with a PAYG financing structure”<sup>7</sup>.
102. Notional accounts are a relatively new design paradigm for first pillar pension schemes. Notional accounts switch the method used to compute pensions from a defined benefit formula to a defined contribution formula without actually changing the scheme’s underlying PAYG financing. Each pay cycle, contributions are credited to workers’ notional accounts. Each year, accounts are credited with notional “interest” where the rate is determined by some economic proxy, such as the rate of growth in economy-wide wages. At retirement, notional account balances are used to compute benefits on the basis of average life expectancy. Notional accounts appear (and function) like defined contribution accounts. The key difference between the two is that notional accounts are simply an administrative mechanism for tracking contributions and notional interest; there are no underlying cash transfers or balances.
103. Under an NDC system, contributions are used to finance pensions in the same way that they are under any PAYG scheme but an NDC system also generates a nominal

<sup>7</sup> Williamson (2004)

credit for the current members (and future pensioners). This promise replicates the logic of a financial account, however, there are no actual funds and the returns are not defined by the results of fund investments. At retirement age, individuals have the right to receive a pension calculated as if his/her contributions had been accumulated and “earned” predefined “notional returns”. The chosen rate at which contributions accumulate becomes crucial.

104. NDCs are often an attractive option because they preserve the connection between contributions and pensions (and, therefore, encourage retirement savings and income reporting), and in addition they are more easily managed than FDCs, and the administrative costs are much lower. Further, they are not exposed to financial market fluctuations and do not impose the transition costs associated with the shift to a funded scheme. The latter feature is particularly relevant in the context of the current financial crisis. On the negative side, however, NDCs provide a weaker stimulus for saving and the long-term returns are lower than in the case of funded schemes<sup>8</sup>.
105. Some approaches to first pillar pension design – such as notional defined contribution accounts – are more robust in the face of economic uncertainty and demographic changes (such as falling fertility and increasing life expectancy) than are traditional final-salary defined benefit schemes.
106. The use of notional accounts as a first pillar architecture gives policy makers greater control over the implementation of a second pillar reform (i.e., a reform that does involve the introduction of funding). Introducing a second pillar on top of a traditional defined benefit scheme typically forces policy makers to make decisions about the details of the reform during the design stage, before any experience has been accumulated. Notional accounts, in contrast, enable policy makers to easily adjust that portion of an individual’s contributions that is invested (i.e., funded, rather than notionally credited) and vary the size of that allocation over time thereby giving policy makers control over the pace at which funding is introduced (which may be advantageous in terms of building support for a reform, testing the effectiveness of a country’s regulatory framework, and allowing policy makers to better manage the costs of the transition)<sup>9</sup>
107. Because the benefits provided under a notional account scheme are, by design, earnings-based, adopting notional accounts in a country where the pension system is expected to effect redistribution from the comparatively well-off to the less fortunate will require the introduction of complementary minimum pension provisions.

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<sup>8</sup> For a brief and simple analysis of NDC schemes, including their strengths and weaknesses, see Williamson (2004). A very comprehensive analysis of different aspects of NDC schemes including conceptual issues, design, implementation and case studies can be found in Holzmann and Palmer (2006).

<sup>9</sup> When funding is introduced to a PAYG pension scheme, any contributions that are invested are no longer available to help pay benefits to current beneficiaries. The resulting fiscal shortfall is typically referred to as the *transition cost*.

## **PART III: INTRODUCING SECOND PILLAR PENSIONS**

### **Introduction**

108. The main obstacles that usually prevent countries from adopting a second pillar are: (i) the fiscal costs of transition, (ii) a lack of financial sector instruments, and (iii) a lack of regulatory and supervisory capacity. In the case of Malta – given the binding constraint on the wage subject to contribution – adding a second pillar that applies to salaries *above* the cap would not entail fiscal costs. On the availability of financial instruments, as a member of the European Community Malta will need to align its policies and eventually not discriminate in favor of local financial sector instruments when investing second pillar funds (as has been ruled by the European Commission). Regarding the regulatory and supervisory capacity, the implementation of a second pillar reform will require a parallel process of institutional strengthening of the Malta Financial Services Authority (MFSA) for private pension supervision and regulation.
109. In recent years, the global financial crisis has also been a matter of concern in countries that have introduced second and third pillar pension schemes. Evidence seems to show that an extended financial downturn may affect a group of beneficiaries but the effects are not expected to be generalized. In addition, the impact is naturally lower in countries with multipillar pension systems (as is being considered in Malta) although in times of financial crisis, funded schemes are perceived by many as being more exposed to risk. In any case, the use of gradualism and an analysis of options to minimize potential negative impacts are desirable.
110. Introducing defined contribution pension schemes to play a relevant role in supporting income for the aged demands integration with the reform of the PAYG pillar to provide adequate replacement rates for retirees. Parametric reforms that include a redefinition of the contributory basis of mandatory contributions to the PAYG system are a normal precondition for the successful adoption of a reform based on the generation of retirement savings to be invested in private pension schemes. This may allow increasing the current level of retirement savings and, in addition, prevent a drop in replacement rates. A more diversified pension scheme also serves the objective of minimizing risk through diversification.
111. Funded pension schemes may potentially affect savings and growth, although the effects observed worldwide are not always conclusive. Even in countries with significant development in terms of private pensions, there is no clear evidence of a relevant quantitative impact on savings and growth. Development of institutional financial intermediation and instruments, on the other hand, has been the most indisputable contribution of private pensions to economic growth. Actual growth will depend on many other factors such as investment policies and regulations, the costs of intermediation, and the capacity of the financial sector to effectively absorb new investment capital.

112. The major expected impact of funded schemes is its capacity of the system to adjust automatically to longevity risk and its potential to offer higher pensions if returns on investments are high (although this is at the expense of higher risks). In addition, contributing to both funded and unfunded pension schemes is a form of diversification and thus a way of reducing the risks associated with retirement income savings schemes.
113. Private pension savings could generate different outcomes in terms of income replacement at retirement, depending on the amount and the frequency of contributions, the amount of time an individual contributes, the administrative costs and the returns obtained on investments. Incentives play an important role in promoting the development of retirement savings. The Maltese government may consider introducing tax incentives to enhance the expansion of voluntary private pensions, but the social costs and benefits should first be assessed.
114. This section of the report discusses the issues and options associated with the introduction of mandatory and voluntary funded pension arrangements in Malta as part of broader efforts to reform the country's social protection system. The analysis and recommendations contained herein are based on generally accepted best practices (to the extent that such practices exist – for many issues, they do not), lessons derived from international experience with funded pension arrangements, and the team's experience from working on similar issues in other countries over the past two decades.
115. To facilitate an informed and focused dialogue, issues are discussed under the following categorical headings: (i) funded pension arrangements in the context of first pillar pension reform, (ii) the merits and risks associated with funded pension arrangements, (iii) the institutional arrangements available for funded pension arrangements, (iv) the degree to which participants should be given choice over how their contributions are invested, (v) the use of investment guidelines to protect participants from imprudent risk, (vi) the importance of designing sensible default options for the vast majority of participants who lack the skills or willingness to make active decisions over how their assets will be invested, (vii) the options available to policy makers for using accumulated assets to provide benefits for participants in retirement, (viii) the need for an appropriate governance structure to support funded pension arrangements, (ix) the role of regulatory oversight, (x) issues relating to the taxation of funded pension arrangements, (xi) the interaction between mandatory funded pension arrangements and invalidity and survivorship programs, (xii) specific issues relating to voluntary funded arrangements, (xiii) other matters, and (xiv) the impact of a funded pension scheme on levels of income replacement and the potential accumulated capital that could result from the introduction such a scheme.

## *Funded Pension Arrangements in the Context of First Pillar Reform*<sup>10</sup>

116. The proper starting point for any public pension reform is for policy makers to establish an *income replacement objective* (i.e., a targeted level of post-retirement benefits for a given level of pre-retirement income). This decision necessarily requires policy makers to weigh two competing objectives: *benefit adequacy* (i.e., providing benefits sufficiently large to prevent old age poverty) and *affordability* (i.e., providing benefits that do not represent an undue burden on employees, employers, or the government). These objectives are not in rigid trade-off, of course, because public pension systems can be designed to effect redistribution from the comparatively well-off to the less fortunate, thereby improving adequacy for vulnerable groups without requiring greater aggregate resources. In general, however, the principle remains valid that the higher the income replacement objective, the higher a pension system's aggregate costs and vice versa.
117. Policy makers must then decide what portion of this income replacement objective should be mandated and what portion can be left to individual choice. Here, policy makers must grapple with the problem of myopia (i.e., the generalized reluctance on the part of many people to adequately save for their retirement). Mandating greater savings than is strictly needed to meet adequacy objectives will undoubtedly address the problem of myopia on the part of scheme participants, but large mandates can engender opposition, rendering otherwise sensible reforms politically and socially unpalatable, and can have the perverse consequence of undermining social insurance objectives by encouraging labor migration from the formal to informal sectors. Moreover, mandating more savings than is required for benefit adequacy is necessarily welfare-reducing because it forces some people to defer more consumption from their working years into retirement than they would otherwise choose to defer. For those persons who do wish to save beyond what is provided under mandated pillars of social insurance, voluntary retirement savings arrangements are needed and are typically supported by tax incentives (discussed further later).
118. For first pillar schemes to provide meaningful protection for subsequent generations, schemes must be sustainable in the face of demographic and other changes.<sup>11</sup> This can only be accomplished on the basis of detailed actuarial modeling that relies on reasonable assumptions about the future. Modeling should ideally be conducted on an ongoing basis so that a scheme's parameters can be tweaked over time as experience is

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<sup>10</sup> Throughout this report, a *first pillar* pension scheme refers to any form of a mandated contributory PAYG scheme (such as the public scheme that exists currently in Malta); a *second pillar* pension scheme refers to any form of a mandated funded scheme, regardless of whether it is publicly or privately managed, provided that participants are assuming investment-related risks; and a *third pillar* pension scheme refers to any voluntary retirement savings arrangement, regardless of how it is financed or managed.

<sup>11</sup> In the context of population aging, PAYG financing typically presents policy makers with a difficult tradeoff between holding benefits constant (which generally requires higher contribution rates) and holding contribution rates constant (which generally requires cuts in benefits, increases in retirement ages, or changes in eligibility criteria).

accumulated.<sup>12</sup> Unsustainable designs (i.e., schemes that promise more in the way of benefits than can be afforded over time) only serve to effect intergenerational transfers – typically by awarding higher benefits to the current generation at the expense of subsequent generations. In the face of population aging, restoring actuarial balance to PAYG public pension schemes becomes increasingly painful the longer reforms are delayed. This is not only unfair to future generations, but it also compounds the difficulty of protecting them from falling into poverty in their old age. For this reason, it is important for policy makers to act decisively and rapidly to restore long-term actuarial balance – even in cases where PAYG pension schemes are not projected to become insolvent for many years into the future.

119. Only once the actuarial analysis has been completed can policy makers reasonably consider how to best attain their targeted level of income replacement – not only for workers with lifetime average earnings but also for those with intermittent or lifetime low earnings. First pillar schemes offer policy makers the opportunity to effect redistribution from the comparatively well-off to the less fortunate to ensure a minimal level of benefit adequacy for all full career workers.<sup>13</sup> The degree of redistribution effected by first pillar pension schemes is a public policy choice that necessarily reflects social norms, fiscal constraints, and other factors. Actual practice varies enormously from country to country. Redistribution can be accomplished by establishing minimum benefit guarantees (which effectively create a benefit floor for persons with low lifetime wages that is financed by reducing benefits for everyone else), by using benefit formulas that award less benefit credit as incomes rise (which effects progressive transfers across the entire income spectrum), or by other means. Funded second pillar schemes, in contrast, are generally, but not always, earnings-based – meaning that the benefits they provide are a direct function of an individual’s wages and investment income.
120. Because it is the *combination* of benefits provided by both pillars of social insurance that must meet the income replacement mandate, the introduction of funded pension arrangements is a public policy decision that can only be reasonably considered as part of a comprehensive effort to reform a country’s overarching social protection system.

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<sup>12</sup> Aggregate system modeling should be supported by distributional analysis to understand how benefit provisions impact persons with chronically low earnings, higher-than-average earnings, and intermittent and short service work histories.

<sup>13</sup> Persons with less than full career work histories (and those employed in informal economic activity) are generally addressed outside of the social insurance system by programs of social assistance. Some countries offer “zero” pillar pension schemes (sometimes referred to as *social pensions* or *demogrants*) which are typically noncontributory schemes intended to prevent old age poverty for lifetime low wage earners and persons who participate only marginally in the formal economy.

### Merits and Risks of Funded Pension Arrangements

121. The introduction of a second pillar pension scheme – as one component of a broader program of reform – is a common prescription for reforming unsustainable PAYG pension systems. There are three valid reasons for this.<sup>14</sup>
- a. *By virtue of being fully funded, second pillar schemes do not create unfunded liabilities (i.e., implicit debt) which must eventually be paid from future tax revenues or other sources.* This has the advantage of increasing the transparency of public accounting and reducing the complexity of managing total public debt.
  - b. *By virtue of relying on the financial markets rather than on future tax revenues, second pillar schemes diversify risk by insulating a portion of pension benefits from the risks inherent in PAYG financing.* This can improve the security of benefits, particularly in countries where the population is aging.<sup>15</sup>
  - c. *Over the long-term, the financial markets can reasonably be expected to generate, on average, higher rates of return on contributions than can be sustained by PAYG financing.* In theory, this should enable second pillar schemes to either (i) pay higher benefits for a given contribution rate or (ii) pay the same benefits at lower aggregate cost.
122. This third reason – that funded pension schemes *should* (but are not guaranteed to) yield higher benefits than can be afforded by PAYG financing – is both attractive to and troubling for most policy makers. By funding pension benefits on the basis of a multipillar system, governments face less risk from short-term macroeconomic forces that can reduce the volume of contributions available to fund PAYG benefits and from the long-term uncertainty surrounding population aging. Both are unambiguously beneficial. What is troubling, of course, is that this reduction in risk for the government's balance sheet comes at the potential expense of participants who are deprived of *predictability* (the benefits they received from the second pillar schemes cannot be known in advance which makes it impossible for them to estimate how much they should save on a voluntary basis to achieve their targeted standards of living in retirement) and *certainty* (their benefits are not assured but are dependent on the returns generated by the financial markets which can vary greatly as function of their portfolio strategy and to the fickleness of timing). This transfer of risk from the

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<sup>14</sup> Other arguments sometimes voiced in support of funding include the assertion that it may (i) increase aggregate savings and (ii) improve capital efficiency by funneling savings through formalized financial markets (thereby promoting their development), encourage the issuance of longer-term instruments, contribute to the establishment of a yield-curve (in countries where sovereign debt is not yet offered with longer maturities), and reduce term-transformation risk in the banking sector. The evidence for increased aggregate savings, however, is ambiguous; most studies suggest that new savings in second pillar accounts is at least partially offset by reduced savings elsewhere. The arguments for improved capital efficiency are more compelling (but equally unproven) but are less relevant for Malta given its adoption of the Euro, its open capital account, and its economic integration with the European Union.

<sup>15</sup> PAYG financing is inherently vulnerable to changes in the ratio of contributors to beneficiaries as well as to patterns of wage growth. While population aging is a known and predictable phenomenon, rates of change in fertility, net population migration, and lengthening life expectancy are impossible to predict with certainty. This exposes pension schemes which rely on PAYG financing to risk. This is particularly true for defined benefit schemes where benefit promises accrue independently of the fiscal resources available to finance them.

public sector's balance sheet to pension scheme participants is an inherent consequence of funding although the risks of funding are substantially higher in some countries than in others.

123. In Malta, the prospects for funded pension arrangements are far more promising than they are in most other countries of comparable development. International experience suggests that the primary reasons that funded arrangements fail to meet expectations include (i) underdeveloped financial markets and limited opportunities for diversification (which is not the case in Malta given its unrestricted access to some of the world's most developed financial markets in Europe – as well as to other mature markets around the globe – by virtue of its membership in the European Union), (ii) prohibitions on foreign investments and foreign exchange risk (which also does not apply to Malta given its adoption of the Euro and the fact that the European Union forbids its members to impose such restrictions), (iii) corruption and other weaknesses in the rule of law (which are not widespread in Malta), and (iv) inadequate supervision and oversight (for a country of Malta's size and level of development, it has a remarkably well-developed financial sector, and the capacity of its financial sector regulator is commensurately greater). In addition, Malta's access to European financial markets means that accumulated assets in funded pension accounts can be transformed into pension benefits by purchasing lifetime annuities in Europe's insurance markets. In many emerging economies, annuity products simply do not exist or are insufficiently reliable. Two additional risks – the use of pension fund assets as a captive source of governmental financing, sometimes at below-market rates of return, and governmental influence over pension fund investment decisions in pursuit of social, developmental, or political objectives – still exist in Malta, of course, and merit concern, but both can be addressed by outsourcing investment management to outside professionals and by crafting suitable investment guidelines for those managers to follow.
124. The recent global financial crisis has unsettled even the most experienced investors and financial market experts, but it did not undermine the strength of the case for second pillar schemes. The crisis did, however, underscore the risks that funding imposes on participants<sup>16</sup> and reveal flaws in the design of many funded arrangements. In particular, the crisis has made it clear that (i) better crafted *investment guidelines* are needed in some countries to create a more appropriate *box of prudent risk* in which investing is conducted and (ii) better *default options* are needed in virtually all countries to better manage portfolio risk (especially during the period just prior to retirement) for the vast majority of second pillar scheme participants who lack the skills or motivation to actively manage their investments. In addition, the crisis has reminded the financial community that malfeasance exists in even mature and well-

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<sup>16</sup> The risks of funded arrangements are not always entirely borne by participants, of course. Governments that offer minimum pension guarantees and other redistributive transfers in support of multipillar pension schemes have seen the cost of those provisions rise substantially as a result of the financial crisis. In the extreme case of Argentina, the government even took the dramatic step of nationalizing what had been a fully privatized pension system. The fact remains, however, that risks of funded arrangements are borne first and foremost by participants.



regulated markets, underscoring the importance of (i) internal controls, such as regulations governing disclosure, auditing, and the use of custodians,<sup>17</sup> (ii) stringent criteria for the licensing and registration of market participants, and (iii) regulatory oversight.

125. When considering reforms that involve the introduction of funding, policy makers must also consider the magnitude and timing of transition costs. Transition costs arise from the fact that funding prepays pension liabilities whereas PAYG financing defers payment until the liabilities become due. Transition costs can only be estimated on the basis of actuarial modeling, of course, but their general pattern is to rise over time as more of the active labor force is enrolled in the funded scheme (older workers are typically excluded from second pillar reforms when schemes are introduced because older workers have the least to gain from funding<sup>18</sup>). Transition costs will peak, then subside over time (as older cohorts who were not subject to the reform begin to die off), and then, over the course of many years, gradually disappear. Transition costs can be funded by increasing contribution rates, reducing benefits for future beneficiaries (cutting benefits for existing pensioners and for persons very close to retirement is not only politically unpalatable in most countries but unfair and may put some persons at risk), or by transfers from the general budget or other sources.
126. Regardless of whether a second pillar is included in a program of comprehensive reform, policy makers in Malta should take steps to encourage the emergence of voluntary funded arrangements (i.e., a third pillar scheme) for those persons who wish to save more than is provided under Malta's mandatory pillars of social insurance. In addition to helping some workers attain higher levels of income replacement in retirement, promoting voluntary funded arrangements will also enable policy makers to (i) assess the adequacy of the regulatory framework (and give the Malta Financial Services Authority time to build capacity) and (ii) begin the process of promoting a savings ethos and building confidence in financial instruments and markets among the Maltese population. However, expectations for voluntary funded arrangements should be modest. International experience suggests that rates of participation in third pillar schemes are typically lower than policy makers might expect. Moreover, most participants are likely to be comparatively well-off and not in actual need of additional savings to avoid poverty in their old age. To the contrary, they are likely to participate in a third pillar scheme primarily to take advantage of the tax incentives it offers. For this reason, contributions to a third pillar scheme should be subject to an annual ceiling, and the ceiling should be indexed to average wage growth to maintain its relative value over time (discussed further later).

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<sup>17</sup> The use of global custodians is an accepted practice in the global financial industry. In exchange for a fee, global custodians act as an intermediary between fund managers, who are responsible for making investment decisions, and the assets they manage. Custodians are generally internationally recognized banks or specialist custodian institutions which have met various criteria, including capitalization requirements.

<sup>18</sup> By virtue of being closest to retirement, older workers have short investment horizons (which implies that their assets must be invested conservatively in fixed income instruments of relatively short duration) and will also not benefit as much from the compounding of their returns over time.

### Institutional Arrangements

127. Implementing a funded pension scheme requires policy makers to address three basic operational functions. These include (i) the *management of cash flows* (to include, inter alia, the collection and transfer of contributions from employers to the custodian accounts of fund managers, the management of cash flows relating to investment accounts, and the payment of benefits), (ii) *record keeping and reporting*, and (iii) the *management of investments*.<sup>19</sup> These functions can be bundled (as is the case for most voluntary private pension funds which typically always provide the first two services but may elect to outsource responsibility for the third), or they can be segregated and handled by separate institutions. Even when all three functions are bundled, however, custodians are typically responsible for the physical custody of cash and invested assets which necessarily requires them to be involved in the management of investment-related cash flows on behalf of investment managers; moreover, insurance companies and other providers are involved in the payment of benefits whenever annuity products are used to transform accumulated assets into benefits at the point of eligibility.
128. When introducing second pillar reforms, policy makers must choose between two basic models for allocating responsibility over these basic functions. The first model relies entirely on the private sector and was adopted by most Latin American and several European countries that have introduced funded second pillar schemes. Under this model, workers are required to enroll in a pension fund provided by a private provider – either an occupational scheme sponsored by their employer or one that is open to everyone. To provide uniformity (and facilitate portability), schemes are typically bound by a common policy framework. In those Latin American countries that fully privatized their pension schemes (such as Chile and Argentina although the Argentinean reform was later reversed), private pension funds are encouraged to compete with one another. While this first model has proven workable, international experience has revealed some drawbacks. First, it can lead to “herding” behavior whereby all pension funds purchase virtually identical portfolios. This typically happens when formalized mechanisms are put in place to penalize funds for underperforming a market benchmark or to force them to guarantee a minimum rate of return. Herding can also happen when the range of investment options is limited (for example, as a result of restrictions on investments in foreign financial markets) or when investment guidelines are overly strict. Second, this model creates a sizeable regulatory burden by adding substantially to the number of market participants. It also denies the government any role in provider selection beyond establishing licensing and registration criteria. Third, this model is more expensive in terms of increasing the wedge between the *gross returns* earned on pension assets and the *net returns* actually received by pension scheme participants. The higher this wedge, the less compelling are the arguments for funded schemes; it is essential, therefore, during the design phase of a reform, for policy makers to choose designs that keep costs to

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<sup>19</sup> In addition, funded pension schemes provide for the legal ownership of invested assets, but this is less an issue of operational function than a matter of legal form (typically as a trust or foundation).

reasonable levels. The significance of this choice cannot be emphasized too strongly, and an alternative approach does exist.

129. Instead of relying on private pension funds to provide all of the operational functions required by a second pillar, the collection of contributions, record keeping, and (depending on how benefits are provided) the payment of benefits could be provided using the same infrastructure that is used for the first pillar scheme, but accumulated assets could be invested by independent outside investment managers hired via public tender. Under this approach, contributions would be collected by the Inland Revenue Department – which would be responsible for transferring the funds to the custodian accounts of investment managers – while the Department of Social Security would be responsible for record keeping and reporting to contributors and beneficiaries.<sup>20</sup> This approach offers the opportunity to (i) contain costs by avoiding the needless duplication of cash management functions on a smaller and far less efficient scale, (ii) reduce the administrative burden on employers, and (iii) give greater flexibility to participants who can freely allocate their assets across the investment offerings of many different asset managers. This approach would give the Government of Malta substantial negotiating power to keep fees low when outsourcing the management of investments – particularly when investment choices are limited to index funds (as is discussed in the next section) – and to control provider selection.<sup>21</sup> Finally, this approach would reduce the burden of market oversight and should reduce regulatory risk by limiting the number of market participants and by eliminating opportunities for the co-mingling of funds and other forms of malfeasance. In practice, this approach is still relatively new and not widely adopted, but studies suggest that it performs as intended and can substantially reduce the wedge between gross and net returns on invested assets vis-à-vis a decentralized model which relies entirely on private sector providers. For this reason, this approach is recommended for Malta.

### **Investment Choices**

130. An analysis of funded pension schemes worldwide clearly reveals a lack of consensus on the question of the degree to which participants should be given control over how their contributions are invested. Actual practices vary enormously across countries – primarily but not always – as a function of per capita income:
- a. *High income countries with well-developed financial markets typically grant participants considerable latitude to manage their investments.* In the Swedish Premium Pension System, for example, the degree of choice seems overwhelming: 86 fund managers were licensed and a total of 785 investment

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<sup>20</sup> The reliance on a centralized mechanism for the collection of contributions and record keeping in support of funded pillars (sometimes called the *clearinghouse model*) has been adopted successfully in Sweden, Poland, Argentina, Croatia, and Italy although contributions are not collected by a unified tax authority in all cases.

<sup>21</sup> For this to be beneficial, of course, investment managers must be selected via a public tender process that is objective, transparent, accountable, and free of conflicts of interest. In smaller countries, the hiring of established asset managers with proven experience in the markets in which they invest and strong track records for serving other institutional clients is preferable to hiring local firms, even if some local firms do have the requisite experience and skills.

funds (including equity funds, balanced funds, fixed income funds, and life cycle funds) had been established by the end of 2007. In practice, the large number of investment funds seems to be defeating investor choice rather than facilitating it: remarkably few individuals have actually changed their asset allocation decisions since the first round of fund choices in 2000. Australia offers even more choices under its superannuation system (the country's primary mandatory retirement scheme): at the end of 2007, 575 pension firms with at least 4 members had been established; moreover, roughly two thirds of them (63%) offered an average of 38 investment funds apiece.

b. *In contrast, the options offered to the participants of mandatory defined contribution pension schemes in Latin American and Eastern European are far more limited.* In 2002, Chile was the first country to offer investment choice to scheme participants; other countries have since followed suit including Peru (in 2003) and Mexico (in 2004). Five investment funds are available in both Chile and Mexico, while only three are available in Peru. The difference between the funds lies with their permitted exposure to equities. The more aggressive funds in Chile and Peru may invest up to 80% of their assets in equities. The choices available to investors in Mexico are far more conservative, with the most aggressive fund being allowed to invest no more than 30% of its assets in equities. Despite having been raised recently, ceilings on investments in foreign financial markets remain low: only 20% in Peru and 30% in Chile and Mexico.

131. While opinions differ among experts, investor choice is problematic and generally may be overrated. Even financial experts have difficulty fairly evaluating the performance of investment managers. Differences in aggregate rates of investment return are attributable to differences in underlying portfolio composition. Such structural variation can mask significant differences in risk exposure (including concentrations in particular economic sectors, geographic regions, or market capitalization). These differences are difficult to evaluate, and – as prospectuses for financial instruments are often required to declare: “past performance is no guarantee of future results.” Moreover, short-term market fluctuations can engender anxiety; making some investments (particularly equities) seem riskier than they actually are for investors with longer horizons. To expect the average investor – who lacks training in finance and access to essential analytical tools and data – to evaluate the performance of investment managers is simply unrealistic. In practice, unsophisticated investors are prone to (i) chasing higher returns by repeatedly switching to last year's star performer (often with disappointing results), (ii) creating portfolios that are either excessively conservative (e.g., investing in money market funds which typically generate rates of return that fail to keep pace with inflation) or excessively aggressive (e.g., investing in equity funds that focus on small capitalization companies in emerging markets or distressed companies on the verge of bankruptcy, thereby assuming more risk than is generally appropriate), or – more commonly – (iii) doing nothing at all to manage their retirement savings (i.e., a problem of *investor inertia* which will be discussed further later).

132. It is the role of policy makers to create a *box of prudent risk* that gives participants a reasonable degree of investment choice (for those who wish to be actively involved in the management of their portfolios) and to develop sensible default options (for those who do not).<sup>22</sup> This implies that:

- *The range of investment choices should be limited* to, say, at most ten different investment funds (i.e., individual portfolios managed by outside professional managers).
- *Participants should be allowed to allocate their assets across funds* without restriction.
- *Participants should not be given the option of establishing brokerage accounts* where they can buy and sell securities at their own discretion.
- *Serious consideration should be given to the creation of default options* that improve upon and strengthen those practices currently being used by other countries by learning from their recent experience with the global financial crisis.

133. The question of how many investment funds should be offered – and what sorts of securities each fund should hold – cannot be easily resolved on the basis of global experience. Established best practices simply do not exist, and even among financial experts, opinions vary widely. In the team’s view, it would be sensible for policy makers in Malta to offer, say, (i) an *aggressive OECD fund* (that can invest up to 100% of its assets in equities sold in the financial markets of OECD countries), (ii) a *moderate OECD fund* (that can invest up to 50% of its assets in equities sold in the OECD), (iii) a *conservative OECD fund* (that can invest up to 25% of its assets in equities sold in the OECD), (iv) an *emerging market fund* (that can invest up to 100% of its assets in equities in any emerging financial market, subject to diversification and other restrictions), (v) an *investment grade bond fund* (that is limited to medium and long-term investment grade corporate and government bonds denominated in Euro), and (vi) a *stable value fund* (that invests in short-term Euro-denominated certificates of deposit and other money instruments with the objective of preserving the value of assets relative to inflation for participants nearing retirement). Such core offerings could be supplemented, of course, by additional investment funds to satisfy the appetite of those participants who wish to target particular investment markets or market segments, but the total number of investment funds should be kept small and be limited to non-speculative securities, such as listed stocks and bonds. In addition, all investment funds should be subject to investment guidelines and asset allocation rules that impose additional restrictions and conditions on their investment practices (discussed further in the next section). It merits emphasizing that these suggestions are intended merely to provide policy makers with a *sense* of what funds might be offered to participants. Before specific proposals can reasonably be made, additional study and

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<sup>22</sup> The vast majority of participants in mandatory funded pension schemes typically fall into the latter category. In most countries, most participants lack the skills or willingness to make active decisions over how their assets are invested.

extensive dialogue with policy makers will be needed to insure that proposals are appropriate for Malta and are consistent with local attitudes toward risk and return.

134. Another option available to policy makers is to create a single portfolio – managed by outside investment managers – to collectively invest second pillar assets on behalf of all participants. Under such an arrangement, participants would share, on a pro rata basis, in the returns earned on the portfolio. There are several disadvantages to this approach, however, and it is not recommended. For one, the approach does not differentiate between younger investors with longer time horizons and older investors with shorter horizons. As a result, accumulated assets cannot be easily shifted out of equity investments into fixed income securities of strengthening credit quality and shorter duration as participants approach retirement. This makes it more difficult to protect them from market fluctuations and other timing-related risks. For another, the risk of political interference in the process by which investment choices are made is higher and likely to be more difficult to manage. The creation of a single public portfolio invites the use of accumulated assets to finance developmental objectives, to serve as a cheap (and captive) source of public finance, and to pursue political and other objectives that are not consistent with the principle of fiduciary duty (to be discussed further in the next section). Finally, reaching agreement on an investment strategy for a single public portfolio could prove politically challenging. During the design phase of a pension reform participants might likely feel mistrustful of such an arrangement; their mistrust could undermine public support for the broader program of reform. For these reasons, relying on individual funded accounts as the design architecture for a second pillar scheme is preferred, but it merits mentioning that it is not the only option available to policy makers.

### **Investment Guidelines**

135. As was discussed earlier, investment guidelines are intended to create the *box of prudent risk* surrounding pension fund investments. Investment guidelines generally cover such issues as prudential principles and fiduciary duties, investment objectives, prohibited assets, permitted assets, permitted currencies, permitted exchanges, credit quality restrictions, diversification, per-issuer ceilings, maturity structure, portfolio rebalancing, performance benchmarking, reporting and informational disclosure, and mechanisms of control – such as the use of custodians, the imposition of generally accepted accounting standards, and requirements relating to auditing. The purpose of investment guidelines is not to eliminate investment risk – eliminating risk is not only impossible but would be unwise when viewed from the perspective of opportunity cost – but to establish an overall risk mandate so that (i) investments are conducted within acceptable parameters of risk and return and (ii) risk is managed prudently. Guidelines should be carefully considered and formally approved by a pension fund’s governing body – or, in the case of Malta, whatever body is held responsible for the oversight of the second pillar scheme if a clearinghouse approach is used. Once approved, investment guidelines should be distributed to pension scheme participants and other stakeholders and generally made available to any interested party.

136. Prudent investment management implies a measure of efficiency in that returns on invested capital are maximized within a clearly defined envelope of volatility and probability of capital loss. To accomplish this objective, investment guidelines generally:
- a. *Require broad diversification of investment portfolios*, thereby limiting the risk of capital losses associated with any one investment (or group of related investments) and maximizing returns within known and, chiefly, acceptable levels of risk.
  - b. *Require that investments respect the duration (or term) of expected liabilities*, thereby ensuring that investments are of suitable duration to avoid imposing asset-liability term risk on investors.<sup>23</sup>
  - c. *Ensure sufficient liquidity* so that cash is available (or can easily be obtained) when needed so participants can freely shift their assets from one investment fund to another or liquidate their holdings to purchase annuities at the point of benefit eligibility.
  - d. *Impose rules regarding conflicts of interest* to protect the integrity of the investment process and ensure that decisions are made solely in the interests of scheme participants.
137. While investment guidelines create the box of prudent risk, asset allocation rules define and give shape to that box. Asset allocation rules establish permitted asset classes and establish investment ceilings for each asset class. If Malta elects to use a clearinghouse approach for the architecture of a second pillar scheme, individual asset allocation rules must be created for each investment fund consistent with that fund's mandate.<sup>24</sup> Investment ceilings are not targets, however. Investment managers should be given free reign to develop their own investment targets within established ceilings. Stated another way, managers of investment funds should be allowed to seek opportunities wherever they might find them, within the constraints set for them by a pension scheme's governing body, the scheme's investment guidelines, and the asset allocation rules governing their fund. The use of targets or – worse – the imposition of investment floors is not recommended because it can force investment managers to assume more risk than they deem prudent. Whereas investment guidelines can – and *should* – be made available to the general public, asset allocation rules are typically not distributed beyond a pension scheme's directors and investment managers. Typically, asset allocation rules are prepared by an investment committee established by the scheme's governing body and are reviewed and approved by the entire body.

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<sup>23</sup> This provision implies, for example, that fund managers should not purchase substantial volumes of short-term bills or notes unless their portfolio is specifically intended for investors who are nearing retirement, during which time their assets *should* be increasingly invested in short-term securities of strengthening credit quality.

<sup>24</sup> An *aggressive OECD fund*, for example, should have higher ceilings for equity investments than would, say, a *conservative OECD fund*. Similarly, an *investment grade bond fund* should be entirely prohibited from buying non-investment grade fixed income securities or equities.

138. While opinions may differ among experts, the team believes strongly that asset allocation rules should restrict investments primarily – if not exclusively – to market-based securities. While direct lending (i.e., the making of loans to private companies outside of the financial markets), private equity investments (i.e., the purchasing of shares directly from issuing companies rather than through a stock exchange), and real estate investments are not inappropriate investments – provided they are part of a diversified and sensibly constructed portfolio – they are, in the team’s opinion, philosophically and practically problematic for mandatory funded pension schemes. Direct lending, private equity, and real estate investments are (i) generally illiquid, (ii) difficult to value (which creates problems when investors wish to shift assets from one investment fund to another or to liquidate their holdings at the point of benefit eligibility), (iii) riskier (in terms of opening the door to various forms of malfeasance), and (iv) more difficult for regulators to supervise.
139. Asset allocation rules should entirely prohibit the use of financial derivatives. The recent financial crisis has shown that even relatively sophisticated investors, such as banks and large pension funds, can assume inappropriate levels of risk when investing in derivatives, particularly when those derivatives are based on complex legal contracts involving collateralized mortgage obligations. While securitization (the process of turning streams of cash flows into tradable financial instruments) is not inherently bad, it can create securities that can be difficult to value, particularly when securitization is accompanied by credit supports and other forms of guarantees provided by third parties. The sole exception to this restriction would be the use of derivatives to hedge currency risk. If investments are made in United State dollar-denominated instruments, for example, it would not be inappropriate for investment managers to use currency options or futures to protect participants against fluctuations in the value of the dollar vis-à-vis the euro.
140. Further regulatory recommendations include:
- a. *Avoid imposing restrictions on investing outside of Malta or requiring even a small portion of assets to be invested within Malta.* To the contrary, virtually all second pillar investments can – and *should* – be made in more mature financial markets elsewhere in Europe and around the world. To impose restrictions that force investment managers to make investments in Malta – instead of letting them invest wherever they find the best opportunities, regardless of whether those opportunities lie in Malta or elsewhere – would be a clear violation of the fiduciary duty owed to scheme participants.<sup>25</sup>
  - b. *Consider passive investment management.* Passive management refers to the purchasing of index funds (i.e., specialized mutual funds) which, by design, buy and hold individual securities in direct proportion to their share of the total value of all securities in a given market segment. Such a

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<sup>25</sup> Fiduciary duty is the principle that the directors of public pension funds must always act prudently in the sole interests of their scheme’s participants.



strategy will ensure that accumulated assets in a second pillar scheme will always earn – but never beat – the average rate of return observed in the market. Implementing and monitoring passive management strategy is simple: it involves only the buying of shares in a handful of index funds. Passive management avoids “stock picker” risk and dramatically reduces regulatory risk. Moreover, on average, passive management will generate returns that will outperform actively managed portfolios because actively managed portfolios impose higher fees and other levies that substantially increase the wedge between the gross returns earned on investments and the net returns actually paid to participants.

### Default Options

141. Recent turmoil in financial markets around the globe – in combination with (i) the existence of persistent inertia on the part of investors in retirement savings schemes and (ii) evidence that individual behavior with respect to investments can be inconsistent with the assumptions of conventional utility theory – has underscored the importance of default options to increase the likelihood that investments will earn sufficient real rates of return to generate adequate retirement benefits for participants in mandatory defined contribution pension systems.
142. Worldwide, default options for mandatory funded pension schemes are, for the most part, crudely designed. Global experience seems to provide far more insight into what should *not* be done than it does into what should be done:
  - a. *High income countries with well-developed financial markets typically pay scant attention to the investment portfolio (or portfolios) to which participants are assigned by default if they do not actively make decisions on their own behalf.* In the Swedish Premium Pension System, for example, asset allocation policies for the default portfolio simply emulate the system average with approximately 80% of assets invested in equities. The default portfolio, however, only holds a modest share of total assets (collecting in contributions only 2.5% of wages). Australia’s superannuation system does not even require all firms to offer default investment options. When offered, 55% of assets are, on average, invested in domestic and international equities.
  - b. *In Latin American and Eastern European, only a few countries with mandatory funded pension schemes have even established default options.* The few that do rely on provisions modeled on life cycle funds.<sup>26</sup> In Chile, Peru, and Mexico, for example, ceilings on equity investments are reduced to zero as workers get closer to retirement. The process by which assets are reallocated as workers age, however, is crude and could be improved. In Peru, for example, individuals are enrolled in only one of two funds, as a function of their age. Consequently, their

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<sup>26</sup> A lifecycle fund is a package of individual mutual funds that a private pension fund assembles to help its investors meet their investment objectives without having to select portfolios of funds on their own. The allocation of funds within the fund is altered as an investor moves closer to retirement to help reduce potential volatility and preserve capital.

portfolios are reallocated only once during their working years. In Chile, reallocation is done only twice: once when workers reach 36 years of age and again when workers reach 51 years (for women) or 56 years (for men).

143. The need for better designed default options in mandatory funded pension schemes has only recently been widely recognized. Consequently, best practices have yet to emerge. While opinions among experts likely vary widely, the team believes that default options should be structured such that younger workers – who still have very long investment horizons – are exposed to moderate levels of investment risk, thereby increasing their expected returns at a time when market fluctuations have no practical consequence and when they have the most to gain from the compounding of their returns. Over time, as those workers age, their portfolios should be made more conservative to protect them against volatility risk and capital losses. This can be accomplished if default options are designed to: (i) allocate most second pillar assets when workers are young to equities sold in the financial markets of OECD countries, (ii) progressively shift assets out of equities and into medium to long-term fixed income securities over a period of ten years starting some twelve to fifteen years prior to workers reaching retirement, and (iii) then shift a portion of assets from longer term bonds to shorter term money instruments in the final years before retirement. Rather than reallocating assets only once or twice in abrupt and large increments over an individual's working life, second pillar assets should be reallocated yearly to create a smoother glide path for portfolio holdings and to better protect workers from fluctuating market conditions. For these general recommendations to be used as the basis for actual policies for default options for Malta, however, additional study will be needed, and policy makers must first resolve the question of how many investment funds should be offered – and what sorts of securities each fund should hold.

### **Benefit Payments**

144. Malta's membership in the European Union and its adoption of the Euro mean that accumulated assets in funded pension accounts can be transformed into pension benefits by requiring participants to purchase lifetime annuities in Europe's insurance markets. This also offers the benefit of offloading longevity risk from the public sector to private insurance companies which are better equipped to evaluate and price this risk.
145. Policy makers will need to decide whether to force participants to transform the entirety of their account balances into annuities at retirement or to permit participants to withdraw a portion of their account balances in the form of a lump sum payment or phased withdrawal.<sup>27</sup> In many countries, lump sum payments and phased withdrawals are allowed, typically because participants demand them. Rarely do they serve a legitimate social policy objective. To the contrary, lump sum payments undermine the

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<sup>27</sup> Phased withdrawals refer to withdrawals from investment accounts whereby any remaining assets continue to be invested until such time as they are liquidated and withdrawn by the account holder. Account holders therefore assume the risk that these remaining assets could fall in value. This differs from an annuity contract under which the annuity provider is assuming all investment risk.

objective of poverty alleviation because they reduce the benefits individuals receive over their remaining lifetime. For this reason – and absent compelling arguments to the contrary rooted in the social circumstances of Malta – the team recommends that lump sum payments and phased withdrawals not be universally permitted under a second pillar scheme. Under a voluntary (third pillar) scheme, policy makers might elect to allow lump sum payments, but payments should be limited to prevent the third pillar from becoming an institutionalized mechanism of tax avoidance for the comparatively well-off (this will be discussed further later). In cases where participant account balances are very small,<sup>28</sup> however, policy makers might wish to allow lump sum payments or phased withdrawals because the annuities those balances could purchase would be too small to serve effectively as a mechanism of poverty alleviation anyway.

146. Policy makers must also decide whether to require married participants to purchase joint annuities with the right of survivorship (i.e., annuities that are paid until *both* the primary wage earner and his or her spouse have died) or to allow married participants to purchase individual annuities that terminate upon the participant's death. Requiring married participants to purchase joint annuities has a compelling social policy rationale: it protects spouses who lack their own means of support from falling into poverty in their old age in cases where primary wage earners die first. This protection, however, comes at a real (and measurable) cost: the size of monthly benefits provided by joint annuities is always lower than it would otherwise be – and the difference can be substantial, particularly for participants with very young spouses – because the period over which benefits are paid extends until both spouses have died. Annuity providers recognize this, of course, and price their products accordingly. Whether joint annuities should be required (or simply made available as an option) can only be reasonably evaluated in the context of a broader discussion of survivor provisions in Malta and how they might be amended as part of a comprehensive program of social insurance reform.

### **Governance**

147. For second and third pillar pension schemes to attain their social policy objectives, they must be supported by appropriate mechanisms of governance.<sup>29</sup> The legal basis and framework for funded arrangements should, of course, be established by law, most likely in Malta's case as part of a broader package of legislation required to implement a comprehensive program of social insurance reform. The legislative framework should establish the basic provisions of both pillars but should avoid imposing

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<sup>28</sup> Policy makers will have to define an appropriate threshold for such a provision to be implemented, of course, and the threshold should be indexed to wage growth so that its relative value is preserved over time.

<sup>29</sup> Governance is a complex subject and much has been written about it in association with various disciplines and fields of work. A sufficiently flexible working definition may be offered by the following: "Governance refers to the systems and processes by which a company or government manages its affairs with the objective of maximizing the welfare of and resolving the conflicts of interest among its stakeholders." See Carmichael, J. and R. Palacios (2004). "A Framework for Public Pension Fund Management." In Musalem, A. and R. Palacios, *Public Pension Fund Management: Governance, Accountability, and Investment Policies*. Washington, D.C.: The World Bank.

specificity on a range of issues that might change (or merit being changed), to include, inter alia, the menu of investment funds to be offered to participants, the public tendering procedures to be followed when outside investment managers are recruited and retained, the details of asset allocation rules to be imposed on individual investment managers, the structure of default options, and the provisions for portfolio rebalancing to be followed under those default options. Such issues should be addressed by a governing body established to oversee the operation and design of the schemes. The guiding principle behind this delineation is that the law should establish the rules of the system whereas the governing body should interpret and give specificity to those rules and should be responsible for proposing legislative amendments as needed.

148. Broadly speaking, the benchmarks for effective governance revolve around the principles of clarity of roles, accountability, transparency, and independence from government. The governing body must, of course, be accountable to the government – but it must be insulated from undue political influence – and it should include persons who understand financial markets, risk management, and actuarial principles. Even in cases where sufficient expertise is available locally, governing bodies are encouraged to rely on expert advice from unaffiliated outsiders who can serve as an objective voice during policy debates. The establishment of a governing body raises a number of crucial procedural questions relating to how the governing body should be appointed, by whom, and under what circumstances members can be removed. It is important to emphasize that the governing body for a second and third pillar pension scheme in Malta need not be the same body that oversees the first pillar – to the contrary, it ought to be constituted primarily by persons with financial acumen and practical experience with investment issues – although there should be some overlapping of membership to insure consistency across the social protection framework. Creating an effective and unbiased governance structure for funded pension arrangements is a complex public policy challenge that lacks off-the-shelf solutions – there are few international best practices from which to draw and resolving this challenge can only be reasonably accomplished by taking into account the provisions of existing laws and regulations as well as local practices in Malta.

### **Regulatory Oversight**

149. Assuming that Malta adopts a clearinghouse approach to structuring a second pillar and a third pillar pension scheme, the regulatory challenges will be reasonably modest:
  - a. *Investment managers should be retained by public tender on the basis of an objective and transparent selection process (as was discussed earlier) and be subject to the same regulatory requirements that are applied to other financial service providers in Malta.* This should include, for example, requirements relating to licensing and registration, the use of custodians, auditing and reporting, capitalization, compliance with on-site inspections, and so forth.

- b. *The Malta Financial Services Authority should also be required to (i) enforce compliance on the part of investment managers with the guidelines governing both schemes and with the specifics of any asset allocation rules established for them and (ii) regulate the activities of annuity providers under the same legislative framework that currently exists for other types of insurance products.*
- c. *The Social Insurance Agency (which would be responsible for record keeping and other activities under a second pillar and third pillar scheme) and the Inland Revenue Department (which would be responsible for the collection and allocation of contributions from employers to the custodial accounts of investment managers) should be subject to the same scrutiny that is applied to their activities in support of the current first pillar scheme. In addition, new requirements should be imposed with regard to the reporting of account balances and investment performance to pension scheme participants.*

150. The introduction of funded arrangements in Malta will require a careful review of existing laws and regulations to harmonize and amend them as needed. Policy makers should also evaluate the legal framework for voluntary private pension funds that already exists to assess whether the framework can accommodate what has been proposed herein. If not, it will be necessary to create a new legal framework and to amend accordingly the rules and regulations currently governing private pension funds.

### **Taxation**

151. Funded retirement saving schemes are often supported by tax incentives to encourage participation and – conversely, in the case of *mandatory* funded arrangements – to discourage evasion and the migration of workers from the formal to informal economic sectors. Nonretirement savings accounts are typically taxed on a TTE basis – meaning that (i) initial contributions to accounts are made using already taxed income (T), (ii) investment income is taxed (T),<sup>30</sup> and (iii) withdrawals are exempt from additional taxation (E). Funded retirement accounts, in contrast, can be taxed either on a TEE basis (meaning that initial contributions are made with post tax income but investment income and withdrawals are both exempt from additional taxation) or on a EET basis (meaning that initial contributions and investment income are both exempt from taxes, but withdrawals are taxed, typically at ordinary income rates). Tax incentives in support of funded retirement schemes should generally be provided through tax *deductions* (i.e., reductions in taxable income) rather than tax *credits* (i.e., reductions in tax liability).
152. Whether TEE or EET taxation should be applied to second and third pillar pension schemes in Malta is a matter of policy choice. Taxpayers generally respond more favorably to immediate tax incentives. As a result, EET taxation may encounter less

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<sup>30</sup> The taxation of investment income varies. Some countries tax only received income (i.e., dividend and interest payments and capital gains on the sale of securities) whereas others tax income regardless of whether it is actually received.

political opposition when a second pillar scheme is introduced and may engender higher rates of participation under a voluntary (third pillar) scheme. On a present value basis, of course, both regimes will generate the same tax revenues – assuming that effective marginal tax rates do not change after workers retire, which may not be universally true – but EET taxation defers the receipt of tax revenues into the future. If sufficient fiscal space exists for EET taxation, it is likely the better choice.

153. The following is recommended:

- a. *Existing tax provisions should be carefully reviewed and harmonized with any tax incentives offered in support of a second pillar and third pillar pension scheme.* In particular, policy makers will need to revisit provisions relating to how investment income is currently treated under Malta’s tax code, the allocation of unearned income between spouses, and the current tax treatment of annuities in retirement. Policy makers will have to decide whether to provide comparable tax treatment for existing annuity schemes as is provided under a proposed third pillar arrangement. This is a matter of policy choice, but – if the two serve similar social objectives – consistency argues for tax parity.
- b. *Contributions to a third pillar pension scheme should be subject to an annual cap, and the cap should be indexed to average wage growth to preserve its relative value over time.* The policy objective behind third pillar pension schemes is to provide a reliable and properly regulated mechanism for those persons who wish to save more for their retirement than is provided under the mandated pillars of social insurance. The objective is *not* to subsidize savings or to create an institutionalized mechanism of tax avoidance for the comparatively well-off.
- c. *Matching contributions made by employers to a third pillar pension scheme should be deductible from income subject to corporate taxation.* No other employer incentives are needed or recommended, and employer matching should not be made obligatory.

#### **Interaction with Invalidation and Survivorship Programs**

154. The design of invalidity and survivorship programs is a complex public policy issue. Moreover, there is a distinct lack of consensus on how such programs should be designed, particularly in countries with mandatory funded pension arrangements. In some countries, benefits for invalidity and survivors are provided entirely by the public sector; in others, these benefits are provided entirely by the private sector (typically through the mandatory purchase of invalidity insurance and joint annuity contracts). For Malta, it would be sensible for invalidity and survivorship benefits to continue to be provided through the existing first pillar scheme, but these programs should still be carefully scrutinized, as was discussed earlier, to ensure they are properly designed as part of the Government’s broader program of reform. Two issues merit consideration, however, with respect to the interaction between these programs and funded arrangements:

- a. *Policy makers must decide what happens to the assets of second pillar accounts in the event that a primary wage earner becomes disabled prior to becoming eligible for an old age pension.* Three options exist: account balances can be (i) distributed in a lump sum payment, (ii) held until the individual reaches the normal retirement age (and then distributed as a lump sum or used to buy an annuity), or (iii) transferred to the first pillar pension scheme. There is a compelling argument for this third option because invalidity benefits are based on imputed income (i.e., the presumed income stream the wage earner would have earned had he or she not become disabled and unable to work). Thus, invalidity benefits necessarily effect a transfer of wealth from those workers who do not become disabled to those who do (in this sense, invalidity provisions are pure insurance).<sup>31</sup> From this perspective, using second pillar assets to partially offset the costs of an individual's invalidity benefit is only fair to the rest of participants who are footing the bulk of the bill. Regardless of how fair such policies might be when viewed in a broad context, they may also be quite unpopular, which could undermine support for any reform that adopts them.
- b. *Policy makers must also decide whether to require married participants to purchase joint annuities with the right of survivorship or to allow married participants to purchase individual annuities that terminate upon the participant's death.* This issue was discussed earlier where the point was made that (i) joint annuities provide crucial protection to spouses who lack their own means of support from falling into poverty in their old age in cases where primary wage earners die first, but (ii) this protection comes at the cost of lower monthly benefits.

### **Third Pillar Provisions**

155. Provisions governing a voluntary (third pillar) scheme should be similar, if not identical, to those governing a second pillar scheme. This is certainly true with regard to provisions relating to taxation (both for employers and employees), default options, and matters of governance and regulation. As recommended earlier, however, contributions to a third pillar should be capped to prevent it from becoming an institutionalized mechanism of tax avoidance. For similar reasons, lump sum payments and phased withdrawals should be limited, if not prohibited altogether. Policy makers might wish to expand the degree of choice given to participants under a third pillar scheme, but they should stop short of giving participants the option of establishing brokerage accounts where they can buy and sell securities at their own discretion.

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<sup>31</sup> In the event that a primary wage earner *dies* prior to becoming eligible for an old age pension, second pillar assets are generally treated as part of his or her estate because survivor benefits are generally not computed on the basis of imputed income.

## Other Matters

156. The implementation of funded arrangements will require policy makers to address a number of additional issues which merit brief mention. These include:
- a. *The size of the second pillar:* the contribution rate levied under a second pillar should be consistent with the income replacement mandate discussed earlier and be set on the basis of actuarial modeling and distributional analysis. Policy makers should be conservative in their assumptions, particularly with respect to the real rates of return they anticipate will be earned on second pillar accounts.
  - b. *The cutoff age for inclusion in the second pillar:* this is a policy decision for which there is no clear answer. Excluding all current workers may be politically expedient, but it may raise issues of benefit adequacy if the second pillar is intended to help raise levels of income replacement within the context of a first pillar reform. Certainly, workers within 10 years of retirement should be excluded because they have the least to gain from compounding and the most to lose from financial market volatility. Policy makers must also consider the size and timing of transition costs and the fiscal space available to fund those costs when choosing a cutoff age for inclusion in a second pillar reform.
  - c. *Vesting:* employee contributions to a funded pension scheme should always vest immediately.<sup>32</sup> To encourage retention, any employer that elects to make matching contributions to a third pillar scheme should be allowed to impose reasonable vesting requirements on its contributions (e.g., contributions might vest at the rate of 25% per year starting a year after the contributions were originally made and ending five years after the contributions were originally made).
  - d. *Public education:* adequate resources should be devoted for public education and other measures to promote acceptance and popular support for the reform. Experience from other countries strongly underscores the importance of such efforts when pension reforms involved the introduction of mandatory funded arrangements.
157. Finally, rates of return guarantees or other formal assurances as a way of managing investment risk for second and third pillar accounts should be strongly discouraged. While the intention of such measures is laudable, guarantees are an indirect, potentially expensive, and clumsy way of protecting participants from market risk. Instead, policy makers should focus on designing the *box of prudent risk* discussed earlier and on creating sensible default options. This is particularly true if the first pillar scheme is supported by a minimum pension provision under a broader program of reform.

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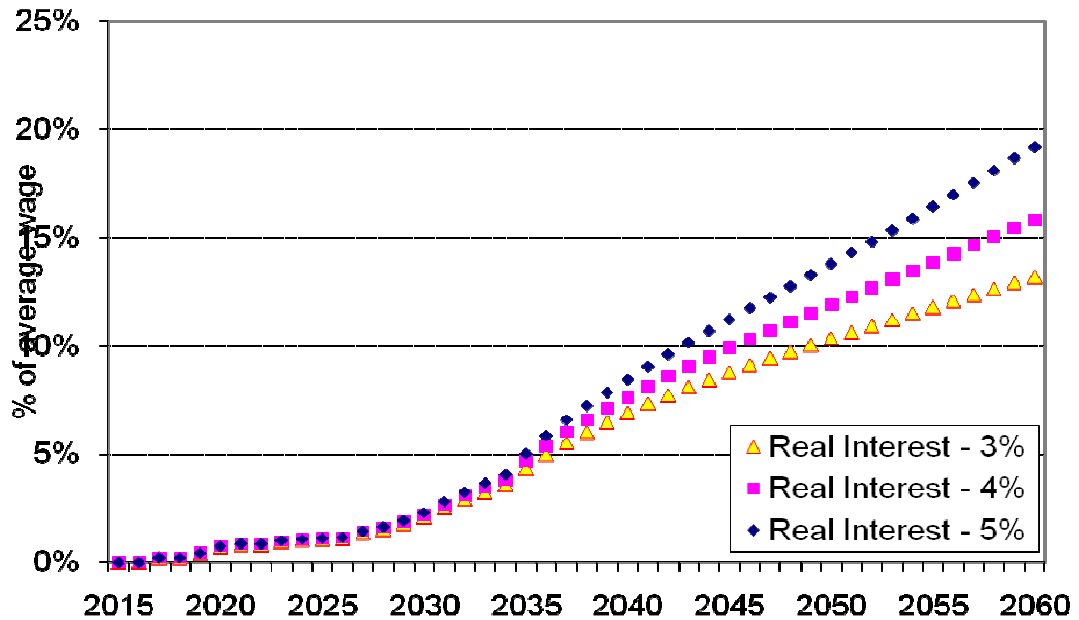
<sup>32</sup> Vesting refers to the unconditional transfer of legal ownership. In the case of employer matching, once contributions have vested, they become irrevocably the property of the employee even if the employee is terminated or elects to leave the service of his or her employer.



## Actuarial Analysis

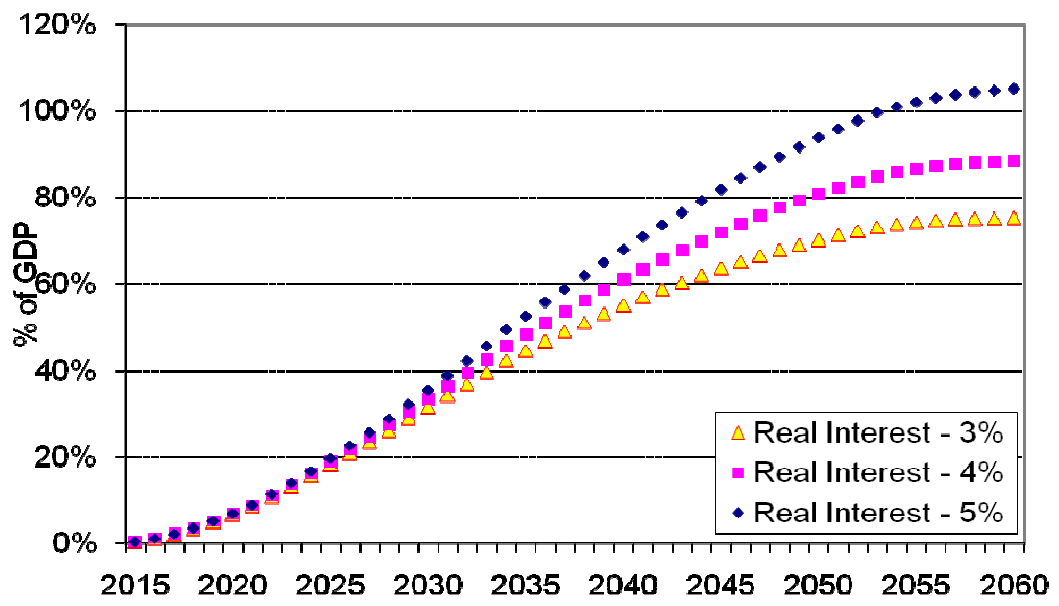
158. Funded pension arrangements have the potential to meaningfully increase levels of income replacement for participants. But – as was discussed earlier – their impact on replacement rates cannot be known with certainty in advance and will vary as a function of (i) the contribution rate levied, (ii) the real rate of return earned on invested assets, (iii) the holding period over which contributions are invested (note that the compounding of investment returns implies that longer holding periods tend to generate substantially higher levels of income replacement than do shorter holding periods), and (iv) issues relating to how benefits are computed at retirement (to include, for example, whether unisex life expectancy tables are used in the computation of annuities at retirement, whether annuities are fixed in nominal terms or indexed to inflation, and whether married couples are required to purchase joint annuities with the right of survivorship or are allowed to purchase individual annuities that terminate upon a participant’s death).
159. Figure 27 illustrates the levels of income replacement that could result from the introduction of a mandatory funded second pillar scheme under a set of assumptions consistent with those used in the first section of this report for the modeling of current law. The figure assumes that (i) a mandatory funded pillar is introduced in 2015, (ii) the contribution rate is initially set quite low – at 2% – but is subsequently increased to 4% in 2017, 6% in 2020, and 8% in 2023 (in all periods, the levy is split equally between employees and employers), (iii) the entirety of an individual’s account balance is used to purchase an annuity at the point of retirement (i.e., lump sum payments are not permitted), (iv) unisex mortality tables are used in the computation of annuities, (v) annuities are indexed to inflation (policy makers should note that indexing benefits to inflation will preserve their real value over time but will also result in lower *initial* levels of income replacement), and (vi) annuities are computed using an assumed real discount rate of 3%.
160. The different plots within the figure show the resulting levels of income replacement at retirement for a male worker retiring in the years shown under three different assumptions (3%, 4%, and 5%) for the real rates of return earned on the worker’s individual investment account under the second pillar scheme. Levels of income replacement for women are similar but slightly lower (by roughly two percentage points, at most, in the final years of the projections) as a result of their retiring earlier than do men. Replacement rates trend upwards over the projection period because (i) the contribution rate is being increased over time and (ii) the length of the investment holding period grows with each additional year of participation in the second pillar scheme.

Figure 27



161. Figure 28 illustrates the value of accumulated assets (expressed relative to GDP) that could result from the introduction of a mandatory funded second pillar. The figure was created using the same assumptions as were discussed above. The different plots within the figure show how the balance of accumulated assets will vary as a function of the assumed real return that is earned on second pillar assets.

Figure 28



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## Annex Table A1

Abridged life table: 2009

| Age | Males |      | Females |       | Total |       |
|-----|-------|------|---------|-------|-------|-------|
|     | lx    | o ex | lx      | o ex  | lx    | o ex  |
| 0   | 10000 | 77,7 | 10000   | 82,2  | 10000 | 79,17 |
| 1   | 9953  | 77,1 | 9945    | 81,68 | 9949  | 78,6  |
| 2   | 9953  | 76,1 | 9919    | 80,9  | 9926  | 77,8  |
| 3   | 9929  | 75,3 | 9919    | 79,9  | 9901  | 77,0  |
| 4   | 9929  | 74,3 | 9894    | 79,1  | 9878  | 76,2  |
| 5   | 9929  | 73,3 | 9894    | 78,1  | 9878  | 75,2  |
| 10  | 9924  | 68,3 | 9874    | 73,2  | 9868  | 70,2  |
| 15  | 9916  | 63,4 | 9866    | 68,3  | 9853  | 65,3  |
| 20  | 9896  | 58,5 | 9858    | 63,3  | 9825  | 60,5  |
| 25  | 9861  | 53,7 | 9845    | 58,4  | 9778  | 55,8  |
| 30  | 9815  | 48,9 | 9812    | 53,6  | 9703  | 51,2  |
| 35  | 9778  | 44,1 | 9795    | 48,7  | 9651  | 46,5  |
| 40  | 9721  | 39,3 | 9780    | 43,8  | 9614  | 41,6  |
| 45  | 9674  | 34,5 | 9756    | 38,9  | 9579  | 36,8  |
| 50  | 9599  | 29,8 | 9695    | 34,1  | 9512  | 32,0  |
| 55  | 9448  | 25,2 | 9585    | 29,5  | 9383  | 27,4  |
| 60  | 9176  | 20,9 | 9435    | 24,9  | 9175  | 23,0  |
| 65  | 8750  | 16,8 | 9159    | 20,6  | 8829  | 18,8  |
| 70  | 7998  | 13,1 | 8748    | 16,4  | 8260  | 14,9  |
| 75  | 6965  | 9,7  | 8132    | 12,5  | 7457  | 11,3  |
| 80  | 5162  | 7,2  | 6902    | 9,3   | 5997  | 8,4   |
| 85  | 3203  | 5,1  | 4981    | 6,9   | 4087  | 6,1   |

## Malta - 2008

### Males

| Age range | nMx     | nqx     | lx     | ndx   | nLx    | Tx      | ex   |
|-----------|---------|---------|--------|-------|--------|---------|------|
| <1        | 0,00657 | 0,00653 | 100000 | 653   | 99412  | 7789689 | 77,9 |
| 1-4       | 0,00023 | 0,0009  | 99347  | 89,41 | 397174 | 7690277 | 77,4 |
| 5-9       | 0,00002 | 0,00011 | 99258  | 10,92 | 496261 | 7293103 | 73,5 |
| 10-14     | 0,00017 | 0,00087 | 99247  | 86,34 | 496019 | 6796842 | 68,5 |
| 15-19     | 0,00035 | 0,00173 | 99160  | 171,5 | 495375 | 6300823 | 63,5 |
| 20-24     | 0,00067 | 0,00333 | 98989  | 329,6 | 494122 | 5805448 | 58,6 |
| 25-29     | 0,00061 | 0,00304 | 98659  | 299,9 | 492549 | 5311326 | 53,8 |
| 30-34     | 0,00084 | 0,00418 | 98359  | 411,1 | 490769 | 4818777 | 49,0 |
| 35-39     | 0,00086 | 0,0043  | 97948  | 421,2 | 488688 | 4328008 | 44,2 |
| 40-44     | 0,00165 | 0,0082  | 97527  | 799,7 | 485637 | 3839320 | 39,4 |
| 45-49     | 0,00178 | 0,00887 | 96727  | 858   | 481493 | 3353683 | 34,7 |
| 50-54     | 0,00376 | 0,01864 | 95869  | 1787  | 474880 | 2872190 | 30,0 |
| 55-59     | 0,00549 | 0,02707 | 94082  | 2547  | 464044 | 2397310 | 25,5 |
| 60-64     | 0,00985 | 0,04806 | 91535  | 4399  | 446677 | 1933266 | 21,1 |
| 65-69     | 0,01751 | 0,08388 | 87136  | 7309  | 417406 | 1486589 | 17,1 |
| 70-74     | 0,0296  | 0,13781 | 79827  | 11001 | 371632 | 1069183 | 13,4 |
| 75-79     | 0,05381 | 0,23715 | 68826  | 16322 | 303324 | 697551  | 10,1 |
| 80-84     | 0,09037 | 0,36857 | 52504  | 19351 | 214140 | 394227  | 7,5  |
| 85-89     | 0,14654 | 0,53624 | 33153  | 17778 | 121318 | 180087  | 5,4  |
| 90-94     | 0,22944 | 0,67949 | 15375  | 10447 | 45533  | 58769   | 3,8  |
| 95-99     | 0,34688 | 0,78335 | 4928   | 3860  | 11128  | 13236   | 2,7  |
| 100+      | 0,50639 | 1       | 1068   | 1068  | 2108   | 2108    | 2,0  |

<http://apps.who.int/ghodata/?vid=720#>

World Health Statistics 2009

## Annex Table A2

**PROST based on Europop, males2009: values of qx**

| Age x | q(x)    | l(x)    | e(x)       | D(x)    | N(x)    | a(x)    |
|-------|---------|---------|------------|---------|---------|---------|
| 20    | 0,00075 | 1,00000 | 56,7       | 1,00000 | 27,4531 | 27,4531 |
| 21    | 0,00077 | 0,99925 | 55,8       | 0,97014 | 26,4531 | 27,2672 |
| 22    | 0,00079 | 0,99847 | 54,8       | 0,94116 | 25,4830 | 27,0762 |
| 23    | 0,00081 | 0,99768 | 53,9       | 0,91302 | 24,5418 | 26,8798 |
| 24    | 0,00083 | 0,99687 | 52,9       | 0,88571 | 23,6288 | 26,6779 |
| 25    | 0,00085 | 0,99604 | 52,0       | 0,85920 | 22,7431 | 26,4702 |
| 26    | 0,00087 | 0,99520 | 51,0       | 0,83346 | 21,8839 | 26,2566 |
| 27    | 0,00090 | 0,99433 | 50,1       | 0,80848 | 21,0504 | 26,0371 |
| 28    | 0,00093 | 0,99343 | 49,1       | 0,78423 | 20,2419 | 25,8114 |
| 29    | 0,00096 | 0,99251 | 48,1       | 0,76068 | 19,4577 | 25,5794 |
| 30    | 0,00099 | 0,99156 | 47,2       | 0,73782 | 18,6970 | 25,3410 |
| 31    | 0,00103 | 0,99058 | 46,2       | 0,71561 | 17,9592 | 25,0962 |
| 32    | 0,00108 | 0,98955 | 45,3       | 0,69405 | 17,2436 | 24,8448 |
| 33    | 0,00113 | 0,98849 | 44,3       | 0,67311 | 16,5495 | 24,5866 |
| 34    | 0,00118 | 0,98738 | 43,4       | 0,65277 | 15,8764 | 24,3216 |
| 35    | 0,00124 | 0,98621 | 42,4       | 0,63301 | 15,2237 | 24,0496 |
| 36    | 0,00131 | 0,98499 | 41,5       | 0,61381 | 14,5907 | 23,7706 |
| 37    | 0,00138 | 0,98370 | 40,5       | 0,59516 | 13,9768 | 23,4844 |
| 38    | 0,00146 | 0,98234 | 39,6       | 0,57702 | 13,3817 | 23,1909 |
| 39    | 0,00155 | 0,98091 | 38,6       | 0,55940 | 12,8047 | 22,8900 |
| 40    | 0,00165 | 0,97939 | 37,7       | 0,54227 | 12,2453 | 22,5817 |
| 41    | 0,00176 | 0,97778 | 36,8       | 0,52560 | 11,7030 | 22,2658 |
| 42    | 0,00188 | 0,97606 | 35,8       | 0,50940 | 11,1774 | 21,9424 |
| 43    | 0,00202 | 0,97422 | 34,9       | 0,49363 | 10,6680 | 21,6114 |
| 44    | 0,00217 | 0,97225 | 34,0       | 0,47828 | 10,1744 | 21,2727 |
| 45    | 0,00233 | 0,97015 | 33,0       | 0,46335 | 9,6961  | 20,9262 |
| 46    | 0,00252 | 0,96788 | 32,1       | 0,44880 | 9,2327  | 20,5720 |
| 47    | 0,00272 | 0,96545 | 31,2       | 0,43463 | 8,7839  | 20,2099 |
| 48    | 0,00294 | 0,96283 | 30,3       | 0,42083 | 8,3493  | 19,8401 |
| 49    | 0,00319 | 0,95999 | 29,4       | 0,40737 | 7,9285  | 19,4626 |
| 50    | 0,00346 | 0,95693 | 28,5       | 0,39424 | 7,5211  | 19,0773 |
| 51    | 0,00377 | 0,95362 | 27,6       | 0,38144 | 7,1269  | 18,6843 |
| 52    | 0,00411 | 0,95003 | 26,7       | 0,36893 | 6,7454  | 18,2837 |
| 53    | 0,00449 | 0,94612 | 25,8       | 0,35671 | 6,3765  | 17,8757 |
| 54    | 0,00492 | 0,94187 | 24,9       | 0,34477 | 6,0198  | 17,4604 |
| 55    | 0,00541 | 0,93724 | 24,0       | 0,33308 | 5,6750  | 17,0380 |
| 56    | 0,00596 | 0,93217 | 23,1       | 0,32163 | 5,3419  | 16,6089 |
| 57    | 0,00659 | 0,92662 | 22,3       | 0,31040 | 5,0203  | 16,1736 |
| 58    | 0,00730 | 0,92052 | 21,4       | 0,29938 | 4,7099  | 15,7324 |
| 59    | 0,00811 | 0,91380 | 20,6       | 0,28853 | 4,4105  | 15,2860 |
| 60    | 0,00904 | 0,90638 | 19,7       | 0,27786 | 4,1220  | 14,8349 |
| 61    | 0,01010 | 0,89818 | 18,9       | 0,26732 | 3,8441  | 14,3800 |
| 62    | 0,01131 | 0,88911 | 18,1       | 0,25692 | 3,5768  | 13,9220 |
| 63    | 0,01268 | 0,87906 | 17,3       | 0,24661 | 3,3199  | 13,4619 |
| 64    | 0,01423 | 0,86791 | 16,5       | 0,23639 | 3,0733  | 13,0007 |
| 65    | 0,01599 | 0,85556 | 15,7       | 0,22624 | 2,8369  | 12,5391 |
| 66    | 0,01796 | 0,84188 | 15,0       | 0,21614 | 2,6106  | 12,0784 |
| 67    | 0,02018 | 0,82676 | 14,3       | 0,20608 | 2,3945  | 11,6195 |
| 68    | 0,02265 | 0,81008 | 13,5       | 0,19604 | 2,1884  | 11,1633 |
| 69    | 0,02542 | 0,79172 | 12,8       | 0,18602 | 1,9924  | 10,7108 |
| 70    | 0,02849 | 0,77160 | 12,2       | 0,17601 | 1,8064  | 10,2630 |
| 71    | 0,03190 | 0,74962 | 11,5       | 0,16601 | 1,6304  | 9,8207  |
| 72    | 0,03569 | 0,72571 | 10,9       | 0,15604 | 1,4644  | 9,3847  |
| 73    | 0,03989 | 0,69981 | 10,2       | 0,14609 | 1,3083  | 8,9558  |
| 74    | 0,04454 | 0,67190 | 9,7        | 0,13617 | 1,1622  | 8,5349  |
| 75    | 0,04970 | 0,64197 | 9,1        | 0,12632 | 1,0261  | 8,1227  |
| 76    | 0,05541 | 0,61007 | 8,5        | 0,11654 | 0,8997  | 7,7201  |
| 77    | 0,06172 | 0,57626 | 8,0        | 0,10688 | 0,7832  | 7,3277  |
| 78    | 0,06868 | 0,54069 | 7,5        | 0,09736 | 0,6763  | 6,9463  |
| 79    | 0,07635 | 0,50356 | 7,0        | 0,08803 | 0,5789  | 6,5764  |
| 80    | 0,08479 | 0,46511 | 6,5        | 0,07894 | 0,4909  | 6,2185  |
| 81    | 0,09408 | 0,42567 | 6,1        | 0,07015 | 0,4120  | 5,8730  |
| 82    | 0,10428 | 0,38563 | 5,7        | 0,06170 | 0,3418  | 5,5404  |
| 83    | 0,11548 | 0,34541 | 5,3        | 0,05365 | 0,2801  | 5,2211  |
| 84    | 0,12775 | 0,30553 | 4,9        | 0,04607 | 0,2265  | 4,9153  |
| 85    | 0,14116 | 0,26649 | 4,6        | 0,03902 | 0,1804  | 4,6235  |
| 86    | 0,15576 | 0,22888 | 4,2        | 0,03253 | 0,1414  | 4,3456  |
| 87    | 0,17158 | 0,19323 | 3,9        | 0,02667 | 0,1088  | 4,0817  |
| 88    | 0,18866 | 0,16007 | 3,6        | 0,02145 | 0,0822  | 3,8316  |
| 89    | 0,20712 | 0,12987 | 3,4        | 0,01689 | 0,0607  | 3,5947  |
| 90    | 0,22698 | 0,10297 | 3,1        | 0,01301 | 0,0438  | 3,3707  |
| 91    | 0,24829 | 0,07960 | 2,9        | 0,00976 | 0,0308  | 3,1588  |
| 92    | 0,27113 | 0,05984 | 2,6        | 0,00712 | 0,0211  | 2,9580  |
| 93    | 0,29561 | 0,04361 | 2,4        | 0,00504 | 0,0139  | 2,7669  |
| 94    | 0,32187 | 0,03072 | 2,3        | 0,00345 | 0,0089  | 2,5837  |
| 95    | 0,35005 | 0,02083 | 2,1        | 0,00227 | 0,0055  | 2,4054  |
| 96    | 0,38033 | 0,01354 | 2,0        | 0,00143 | 0,0032  | 2,2272  |
| 97    | 0,41289 | 0,00839 | 1,9        | 0,00086 | 0,0018  | 2,0397  |
| 98    | 0,43955 | 0,00493 | 1,8        | 0,00049 | 0,0009  | 1,8241  |
| 99    | 0,47004 | 0,00276 | 1,8        | 0,00027 | 0,0004  | 1,5145  |
| 100   | 0,50082 | 0,00146 | <b>2,0</b> | 0,00014 | 0,0001  | 1,0000  |

## Annex Table A3

**Life Office Pensioners, males, Normals, lives - PNML00 ultimate: values of qx**

| Age $x$ | $q(x)$  | $l(x)$  | $e(x)$     | $D(x)$  | $N(x)$  | $a(x)$  |
|---------|---------|---------|------------|---------|---------|---------|
| 20      | 0,00046 | 1,00000 | 59,8       | 1,00000 | 28,1208 | 28,1208 |
| 21      | 0,00047 | 0,99954 | 58,8       | 0,97042 | 27,1208 | 27,9474 |
| 22      | 0,00047 | 0,99907 | 57,8       | 0,94172 | 26,1504 | 27,7688 |
| 23      | 0,00048 | 0,99860 | 56,8       | 0,91386 | 25,2087 | 27,5848 |
| 24      | 0,00048 | 0,99812 | 55,9       | 0,88682 | 24,2948 | 27,3954 |
| 25      | 0,00049 | 0,99765 | 54,9       | 0,86058 | 23,4080 | 27,2003 |
| 26      | 0,00049 | 0,99716 | 53,9       | 0,83511 | 22,5474 | 26,9994 |
| 27      | 0,00050 | 0,99667 | 52,9       | 0,81039 | 21,7123 | 26,7925 |
| 28      | 0,00051 | 0,99618 | 52,0       | 0,78639 | 20,9019 | 26,5795 |
| 29      | 0,00052 | 0,99567 | 51,0       | 0,76310 | 20,1155 | 26,3603 |
| 30      | 0,00053 | 0,99516 | 50,0       | 0,74049 | 19,3524 | 26,1345 |
| 31      | 0,00054 | 0,99464 | 49,0       | 0,71855 | 18,6119 | 25,9022 |
| 32      | 0,00055 | 0,99410 | 48,1       | 0,69724 | 17,8934 | 25,6631 |
| 33      | 0,00057 | 0,99355 | 47,1       | 0,67656 | 17,1961 | 25,4171 |
| 34      | 0,00059 | 0,99298 | 46,1       | 0,65648 | 16,5196 | 25,1639 |
| 35      | 0,00061 | 0,99240 | 45,1       | 0,63698 | 15,8631 | 24,9035 |
| 36      | 0,00064 | 0,99179 | 44,2       | 0,61805 | 15,2261 | 24,6358 |
| 37      | 0,00067 | 0,99115 | 43,2       | 0,59966 | 14,6081 | 24,3604 |
| 38      | 0,00070 | 0,99049 | 42,2       | 0,58181 | 14,0084 | 24,0773 |
| 39      | 0,00074 | 0,98979 | 41,3       | 0,56447 | 13,4266 | 23,7864 |
| 40      | 0,00079 | 0,98906 | 40,3       | 0,54762 | 12,8621 | 23,4874 |
| 41      | 0,00084 | 0,98828 | 39,3       | 0,53125 | 12,3145 | 23,1804 |
| 42      | 0,00091 | 0,98744 | 38,4       | 0,51534 | 11,7833 | 22,8651 |
| 43      | 0,00098 | 0,98655 | 37,4       | 0,49988 | 11,2679 | 22,5415 |
| 44      | 0,00106 | 0,98558 | 36,4       | 0,48484 | 10,7680 | 22,2094 |
| 45      | 0,00116 | 0,98454 | 35,5       | 0,47022 | 10,2832 | 21,8689 |
| 46      | 0,00127 | 0,98340 | 34,5       | 0,45600 | 9,8130  | 21,5199 |
| 47      | 0,00140 | 0,98215 | 33,5       | 0,44215 | 9,3570  | 21,1623 |
| 48      | 0,00154 | 0,98078 | 32,6       | 0,42868 | 8,9148  | 20,7961 |
| 49      | 0,00171 | 0,97927 | 31,6       | 0,41555 | 8,4862  | 20,4215 |
| 50      | 0,00191 | 0,97759 | 30,7       | 0,40276 | 8,0706  | 20,0385 |
| 51      | 0,00214 | 0,97573 | 29,8       | 0,39028 | 7,6678  | 19,6472 |
| 52      | 0,00240 | 0,97364 | 28,8       | 0,37810 | 7,2776  | 19,2477 |
| 53      | 0,00270 | 0,97130 | 27,9       | 0,36621 | 6,8995  | 18,8404 |
| 54      | 0,00306 | 0,96868 | 27,0       | 0,35458 | 6,5333  | 18,4254 |
| 55      | 0,00346 | 0,96572 | 26,0       | 0,34320 | 6,1787  | 18,0032 |
| 56      | 0,00393 | 0,96238 | 25,1       | 0,33205 | 5,8355  | 17,5741 |
| 57      | 0,00447 | 0,95860 | 24,2       | 0,32111 | 5,5034  | 17,1386 |
| 58      | 0,00509 | 0,95431 | 23,3       | 0,31037 | 5,1823  | 16,6974 |
| 59      | 0,00581 | 0,94945 | 22,5       | 0,29979 | 4,8720  | 16,2511 |
| 60      | 0,00665 | 0,94393 | 21,6       | 0,28937 | 4,5722  | 15,8005 |
| 61      | 0,00761 | 0,93766 | 20,7       | 0,27907 | 4,2828  | 15,3465 |
| 62      | 0,00872 | 0,93052 | 19,9       | 0,26888 | 4,0037  | 14,8902 |
| 63      | 0,01000 | 0,92241 | 19,0       | 0,25878 | 3,7348  | 14,4327 |
| 64      | 0,01148 | 0,91319 | 18,2       | 0,24873 | 3,4761  | 13,9754 |
| 65      | 0,01285 | 0,90271 | 17,4       | 0,23871 | 3,2273  | 13,5198 |
| 66      | 0,01414 | 0,89111 | 16,7       | 0,22878 | 2,9886  | 13,0633 |
| 67      | 0,01569 | 0,87851 | 15,9       | 0,21898 | 2,7598  | 12,6034 |
| 68      | 0,01753 | 0,86472 | 15,1       | 0,20926 | 2,5409  | 12,1420 |
| 69      | 0,01968 | 0,84957 | 14,4       | 0,19961 | 2,3316  | 11,6810 |
| 70      | 0,02219 | 0,83284 | 13,7       | 0,18998 | 2,1320  | 11,2224 |
| 71      | 0,02508 | 0,81436 | 13,0       | 0,18035 | 1,9420  | 10,7680 |
| 72      | 0,02836 | 0,79394 | 12,3       | 0,17071 | 1,7617  | 10,3198 |
| 73      | 0,03207 | 0,77142 | 11,6       | 0,16103 | 1,5910  | 9,8796  |
| 74      | 0,03622 | 0,74668 | 11,0       | 0,15133 | 1,4299  | 9,4490  |
| 75      | 0,04082 | 0,71964 | 10,4       | 0,14160 | 1,2786  | 9,0296  |
| 76      | 0,04588 | 0,69026 | 9,8        | 0,13187 | 1,1370  | 8,6224  |
| 77      | 0,05140 | 0,65859 | 9,3        | 0,12215 | 1,0051  | 8,2286  |
| 78      | 0,05738 | 0,62474 | 8,8        | 0,11250 | 0,8830  | 7,8489  |
| 79      | 0,06382 | 0,58889 | 8,3        | 0,10295 | 0,7705  | 7,4838  |
| 80      | 0,07071 | 0,55131 | 7,8        | 0,09358 | 0,6675  | 7,1336  |
| 81      | 0,07804 | 0,51233 | 7,3        | 0,08443 | 0,5740  | 6,7983  |
| 82      | 0,08579 | 0,47235 | 6,9        | 0,07557 | 0,4895  | 6,4778  |
| 83      | 0,09396 | 0,43182 | 6,5        | 0,06707 | 0,4140  | 6,1716  |
| 84      | 0,10254 | 0,39125 | 6,1        | 0,05900 | 0,3469  | 5,8791  |
| 85      | 0,11152 | 0,35113 | 5,8        | 0,05141 | 0,2879  | 5,5997  |
| 86      | 0,12089 | 0,31197 | 5,4        | 0,04435 | 0,2365  | 5,3324  |
| 87      | 0,13065 | 0,27426 | 5,1        | 0,03785 | 0,1921  | 5,0759  |
| 88      | 0,14081 | 0,23843 | 4,8        | 0,03195 | 0,1543  | 4,8291  |
| 89      | 0,15187 | 0,20485 | 4,5        | 0,02665 | 0,1223  | 4,5903  |
| 90      | 0,16496 | 0,17374 | 4,3        | 0,02194 | 0,0957  | 4,3602  |
| 91      | 0,17866 | 0,14508 | 4,0        | 0,01779 | 0,0737  | 4,1448  |
| 92      | 0,19277 | 0,11916 | 3,8        | 0,01419 | 0,0559  | 3,9437  |
| 93      | 0,20723 | 0,09619 | 3,5        | 0,01112 | 0,0418  | 3,7560  |
| 94      | 0,22194 | 0,07626 | 3,3        | 0,00856 | 0,0306  | 3,5807  |
| 95      | 0,23683 | 0,05933 | 3,1        | 0,00646 | 0,0221  | 3,4164  |
| 96      | 0,25178 | 0,04528 | 3,0        | 0,00479 | 0,0156  | 3,2612  |
| 97      | 0,26823 | 0,03388 | 2,8        | 0,00348 | 0,0108  | 3,1128  |
| 98      | 0,28599 | 0,02479 | 2,6        | 0,00247 | 0,0074  | 2,9739  |
| 99      | 0,30348 | 0,01770 | 2,5        | 0,00171 | 0,0049  | 2,8474  |
| 100     | 0,32070 | 0,01233 | <b>2,4</b> | 0,00116 | 0,0032  | 2,7319  |



## Annex Table A4

**PROST based on Europop, females2009: values of qx**

| Age x | q(x)    | l(x)    | e(x) | D(x)    | N(x)    | a(x)    |
|-------|---------|---------|------|---------|---------|---------|
| 18    | 0,00035 | 1,00000 | 63,2 | 1,06090 | 30,4331 | 28,6861 |
| 19    | 0,00036 | 0,99965 | 62,2 | 1,02964 | 29,3722 | 28,5266 |
| 20    | 0,00037 | 0,99929 | 61,2 | 0,99929 | 28,3426 | 28,3626 |
| 21    | 0,00038 | 0,99893 | 60,3 | 0,96983 | 27,3433 | 28,1938 |
| 22    | 0,00039 | 0,99855 | 59,3 | 0,94123 | 26,3734 | 28,0202 |
| 23    | 0,00040 | 0,99816 | 58,3 | 0,91346 | 25,4322 | 27,8417 |
| 24    | 0,00042 | 0,99776 | 57,3 | 0,88649 | 24,5187 | 27,6581 |
| 25    | 0,00044 | 0,99734 | 56,4 | 0,86031 | 23,6322 | 27,4694 |
| 26    | 0,00046 | 0,99690 | 55,4 | 0,83489 | 22,7719 | 27,2754 |
| 27    | 0,00048 | 0,99645 | 54,4 | 0,81020 | 21,9370 | 27,0760 |
| 28    | 0,00050 | 0,99597 | 53,4 | 0,78623 | 21,1268 | 26,8711 |
| 29    | 0,00053 | 0,99547 | 52,5 | 0,76295 | 20,3406 | 26,6606 |
| 30    | 0,00056 | 0,99495 | 51,5 | 0,74034 | 19,5777 | 26,4443 |
| 31    | 0,00059 | 0,99440 | 50,5 | 0,71837 | 18,8373 | 26,2222 |
| 32    | 0,00062 | 0,99381 | 49,5 | 0,69704 | 18,1190 | 25,9941 |
| 33    | 0,00066 | 0,99320 | 48,6 | 0,67632 | 17,4219 | 25,7599 |
| 34    | 0,00069 | 0,99255 | 47,6 | 0,65619 | 16,7456 | 25,5194 |
| 35    | 0,00074 | 0,99186 | 46,6 | 0,63664 | 16,0894 | 25,2725 |
| 36    | 0,00078 | 0,99113 | 45,7 | 0,61764 | 15,4528 | 25,0191 |
| 37    | 0,00084 | 0,99035 | 44,7 | 0,59918 | 14,8351 | 24,7591 |
| 38    | 0,00089 | 0,98952 | 43,8 | 0,58124 | 14,2359 | 24,4923 |
| 39    | 0,00096 | 0,98864 | 42,8 | 0,56381 | 13,6547 | 24,2187 |
| 40    | 0,00102 | 0,98770 | 41,8 | 0,54686 | 13,0909 | 23,9382 |
| 41    | 0,00110 | 0,98669 | 40,9 | 0,53039 | 12,5440 | 23,6505 |
| 42    | 0,00118 | 0,98560 | 39,9 | 0,51438 | 12,0136 | 23,3556 |
| 43    | 0,00126 | 0,98444 | 39,0 | 0,49881 | 11,4993 | 23,0534 |
| 44    | 0,00136 | 0,98320 | 38,0 | 0,48367 | 11,0005 | 22,7438 |
| 45    | 0,00146 | 0,98186 | 37,1 | 0,46894 | 10,5168 | 22,4266 |
| 46    | 0,00157 | 0,98043 | 36,1 | 0,45462 | 10,0478 | 22,1017 |
| 47    | 0,00170 | 0,97888 | 35,2 | 0,44068 | 9,5932  | 21,7690 |
| 48    | 0,00183 | 0,97722 | 34,2 | 0,42712 | 9,1525  | 21,4284 |
| 49    | 0,00197 | 0,97544 | 33,3 | 0,41392 | 8,7254  | 21,0798 |
| 50    | 0,00214 | 0,97351 | 32,4 | 0,40107 | 8,3115  | 20,7231 |
| 51    | 0,00232 | 0,97143 | 31,4 | 0,38856 | 7,9104  | 20,3583 |
| 52    | 0,00253 | 0,96918 | 30,5 | 0,37637 | 7,5219  | 19,9854 |
| 53    | 0,00276 | 0,96673 | 29,6 | 0,36448 | 7,1455  | 19,6044 |
| 54    | 0,00302 | 0,96407 | 28,7 | 0,35289 | 6,7810  | 19,2156 |
| 55    | 0,00331 | 0,96116 | 27,7 | 0,34158 | 6,4281  | 18,8188 |
| 56    | 0,00364 | 0,95797 | 26,8 | 0,33053 | 6,0865  | 18,4144 |
| 57    | 0,00401 | 0,95449 | 25,9 | 0,31974 | 5,7560  | 18,0024 |
| 58    | 0,00442 | 0,95066 | 25,0 | 0,30918 | 5,4363  | 17,5829 |
| 59    | 0,00488 | 0,94646 | 24,1 | 0,29885 | 5,1271  | 17,1562 |
| 60    | 0,00539 | 0,94184 | 23,3 | 0,28873 | 4,8282  | 16,7224 |
| 61    | 0,00596 | 0,93677 | 22,4 | 0,27881 | 4,5395  | 16,2818 |
| 62    | 0,00660 | 0,93119 | 21,5 | 0,26908 | 4,2607  | 15,8346 |
| 63    | 0,00732 | 0,92504 | 20,6 | 0,25951 | 3,9916  | 15,3812 |
| 64    | 0,00813 | 0,91827 | 19,8 | 0,25011 | 3,7321  | 14,9218 |
| 65    | 0,00904 | 0,91081 | 19,0 | 0,24085 | 3,4820  | 14,4570 |
| 66    | 0,01007 | 0,90257 | 18,1 | 0,23172 | 3,2412  | 13,9872 |
| 67    | 0,01124 | 0,89349 | 17,3 | 0,22271 | 3,0094  | 13,5128 |
| 68    | 0,01257 | 0,88345 | 16,5 | 0,21379 | 2,7867  | 13,0347 |
| 69    | 0,01409 | 0,87235 | 15,7 | 0,20496 | 2,5729  | 12,5535 |
| 70    | 0,01584 | 0,86006 | 14,9 | 0,19618 | 2,3680  | 12,0701 |
| 71    | 0,01785 | 0,84643 | 14,1 | 0,18745 | 2,1718  | 11,5857 |
| 72    | 0,02017 | 0,83132 | 13,4 | 0,17874 | 1,9843  | 11,1015 |
| 73    | 0,02284 | 0,81455 | 12,7 | 0,17004 | 1,8056  | 10,6187 |
| 74    | 0,02590 | 0,79595 | 11,9 | 0,16131 | 1,6355  | 10,1389 |
| 75    | 0,02942 | 0,77533 | 11,2 | 0,15256 | 1,4742  | 9,6633  |
| 76    | 0,03346 | 0,75252 | 10,6 | 0,14376 | 1,3217  | 9,1937  |
| 77    | 0,03810 | 0,72734 | 9,9  | 0,13490 | 1,1779  | 8,7317  |
| 78    | 0,04344 | 0,69963 | 9,3  | 0,12598 | 1,0430  | 8,2791  |
| 79    | 0,04954 | 0,66924 | 8,7  | 0,11700 | 0,9170  | 7,8379  |
| 80    | 0,05649 | 0,63608 | 8,1  | 0,10796 | 0,8000  | 7,4102  |
| 81    | 0,06434 | 0,60015 | 7,6  | 0,09890 | 0,6921  | 6,9978  |
| 82    | 0,07309 | 0,56154 | 7,1  | 0,08984 | 0,5932  | 6,6026  |
| 83    | 0,08274 | 0,52049 | 6,6  | 0,08085 | 0,5033  | 6,2256  |
| 84    | 0,09325 | 0,47743 | 6,1  | 0,07200 | 0,4225  | 5,8679  |
| 85    | 0,10459 | 0,43291 | 5,7  | 0,06338 | 0,3505  | 5,5296  |
| 86    | 0,11672 | 0,38763 | 5,3  | 0,05510 | 0,2871  | 5,2104  |
| 87    | 0,12959 | 0,34239 | 5,0  | 0,04725 | 0,2320  | 4,9098  |
| 88    | 0,14309 | 0,29802 | 4,6  | 0,03993 | 0,1847  | 4,6266  |
| 89    | 0,15736 | 0,25538 | 4,3  | 0,03322 | 0,1448  | 4,3592  |
| 90    | 0,17230 | 0,21519 | 4,0  | 0,02718 | 0,1116  | 4,1061  |
| 91    | 0,18786 | 0,17811 | 3,7  | 0,02184 | 0,0844  | 3,8653  |
| 92    | 0,20403 | 0,14465 | 3,5  | 0,01722 | 0,0626  | 3,6339  |
| 93    | 0,22083 | 0,11514 | 3,3  | 0,01331 | 0,0454  | 3,4083  |
| 94    | 0,23831 | 0,08971 | 3,0  | 0,01007 | 0,0320  | 3,1836  |
| 95    | 0,25656 | 0,06833 | 2,8  | 0,00744 | 0,0220  | 2,9527  |
| 96    | 0,27573 | 0,05080 | 2,7  | 0,00537 | 0,0145  | 2,7054  |
| 97    | 0,29597 | 0,03679 | 2,5  | 0,00378 | 0,0092  | 2,4253  |
| 98    | 0,31849 | 0,02590 | 2,3  | 0,00258 | 0,0054  | 2,0852  |
| 99    | 0,34074 | 0,01765 | 2,1  | 0,00171 | 0,0028  | 1,6401  |
| 100   | 0,36377 | 0,01164 | 2,0  | 0,00109 | 0,0011  | 1,0000  |

**Annex Table A5**

**Insurance cost of survivorship pensions and its components.  
Hypothetical case for males**

| <b>Age</b>   | <b>Survivors<br/>Benefit<br/>(a)</b> | <b>Prob. of<br/>dying<br/>(b)</b> | <b>Proportion<br/>married<br/>(c)</b> | <b>Insurance<br/>Cost<br/>(d)=a*b*c</b> | <b>Contributors'<br/>distribution<br/>(e)</b> |
|--------------|--------------------------------------|-----------------------------------|---------------------------------------|---|---|
| 20           | 14,3                                 | 0,08%                             | 5,0%                                  | <b>0,1%</b>                             | 2,6%  |
| 21           | 14,3                                 | 0,08%                             | 7,2%                                  | <b>0,1%</b>                             | 2,8%  |
| 22           | 14,2                                 | 0,08%                             | 9,6%                                  | <b>0,1%</b>                             | 2,7%  |
| 23           | 14,1                                 | 0,08%                             | 12,2%                                 | <b>0,1%</b>                             | 2,9%  |
| 24           | 14,0                                 | 0,08%                             | 15,0%                                 | <b>0,2%</b>                             | 2,8%  |
| 25           | 13,9                                 | 0,09%                             | 18,0%                                 | <b>0,2%</b>                             | 3,0%  |
| 26           | 13,8                                 | 0,09%                             | 21,1%                                 | <b>0,3%</b>                             | 3,0%  |
| 27           | 13,7                                 | 0,09%                             | 24,4%                                 | <b>0,3%</b>                             | 3,0%  |
| 28           | 13,6                                 | 0,09%                             | 27,7%                                 | <b>0,4%</b>                             | 2,8%  |
| 29           | 13,5                                 | 0,10%                             | 31,2%                                 | <b>0,4%</b>                             | 2,9%  |
| 30           | 13,4                                 | 0,10%                             | 34,7%                                 | <b>0,5%</b>                             | 2,9%  |
| 31           | 13,3                                 | 0,10%                             | 38,2%                                 | <b>0,5%</b>                             | 2,9%  |
| 32           | 13,2                                 | 0,11%                             | 41,8%                                 | <b>0,6%</b>                             | 2,8%  |
| 33           | 13,1                                 | 0,11%                             | 45,3%                                 | <b>0,7%</b>                             | 2,8%  |
| 34           | 13,0                                 | 0,12%                             | 48,8%                                 | <b>0,7%</b>                             | 2,8%  |
| 35           | 12,9                                 | 0,12%                             | 52,3%                                 | <b>0,8%</b>                             | 2,7%  |
| 36           | 12,8                                 | 0,13%                             | 55,7%                                 | <b>0,9%</b>                             | 2,5%  |
| 37           | 12,6                                 | 0,14%                             | 59,0%                                 | <b>1,0%</b>                             | 2,4%  |
| 38           | 12,5                                 | 0,15%                             | 62,2%                                 | <b>1,1%</b>                             | 2,5%  |
| 39           | 12,4                                 | 0,15%                             | 65,2%                                 | <b>1,3%</b>                             | 2,3%  |
| 40           | 12,2                                 | 0,16%                             | 68,1%                                 | <b>1,4%</b>                             | 2,2%  |
| 41           | 12,1                                 | 0,18%                             | 70,8%                                 | <b>1,5%</b>                             | 2,3%  |
| 42           | 12,0                                 | 0,19%                             | 73,4%                                 | <b>1,7%</b>                             | 2,1%  |
| 43           | 11,8                                 | 0,20%                             | 75,8%                                 | <b>1,8%</b>                             | 2,2%  |
| 44           | 11,7                                 | 0,22%                             | 78,0%                                 | <b>2,0%</b>                             | 2,2%  |
| 45           | 11,5                                 | 0,23%                             | 79,9%                                 | <b>2,1%</b>                             | 2,3%  |
| 46           | 11,4                                 | 0,25%                             | 81,7%                                 | <b>2,3%</b>                             | 2,2%  |
| 47           | 11,2                                 | 0,27%                             | 83,3%                                 | <b>2,5%</b>                             | 2,4%  |
| 48           | 11,1                                 | 0,29%                             | 84,6%                                 | <b>2,7%</b>                             | 2,4%  |
| 49           | 10,9                                 | 0,32%                             | 85,7%                                 | <b>3,0%</b>                             | 2,5%  |
| 50           | 10,7                                 | 0,35%                             | 86,6%                                 | <b>3,2%</b>                             | 2,3%  |
| 51           | 10,5                                 | 0,38%                             | 87,3%                                 | <b>3,5%</b>                             | 2,3%  |
| 52           | 10,4                                 | 0,41%                             | 87,8%                                 | <b>3,7%</b>                             | 2,4%  |
| 53           | 10,2                                 | 0,45%                             | 88,1%                                 | <b>4,0%</b>                             | 2,4%  |
| 54           | 10,0                                 | 0,49%                             | 88,2%                                 | <b>4,3%</b>                             | 2,3%  |
| 55           | 9,8                                  | 0,54%                             | 88,2%                                 | <b>4,7%</b>                             | 2,2%  |
| 56           | 9,6                                  | 0,60%                             | 87,9%                                 | <b>5,0%</b>                             | 2,0%  |
| 57           | 9,4                                  | 0,66%                             | 87,5%                                 | <b>5,4%</b>                             | 2,0%  |
| 58           | 9,2                                  | 0,73%                             | 87,0%                                 | <b>5,8%</b>                             | 2,0%  |
| 59           | 9,0                                  | 0,81%                             | 86,3%                                 | <b>6,3%</b>                             | 2,1%  |
| <b>Total</b> | <b>12,3</b>                          | <b>0,23%</b>                      | <b>55,4%</b>                          | <b>1,8%</b>                             | 100,0%  |

Notes: Absolute measurements are in annual salaries.

Totals are weighted averages by contributors' distribution.

**Annex Table A6**

**Insurance cost of survivorship pensions and its components.  
Hypothetical case for females**

| <b>Age</b>   | <b>Survivors<br/>Benefit<br/>(a)</b> | <b>Prob. of<br/>dying<br/>(b)</b> | <b>Proportion<br/>married<br/>(c)</b> | <b>Insurance<br/>Cost<br/>(d)=a*b*c</b> | <b>Contributors'<br/>distribution<br/>(e)</b> |
|--------------|--------------------------------------|-----------------------------------|---------------------------------------|---|---|
| 20           | 13,5                                 | 0,03%                             | 10,9%                                 | <b>0,1%</b>                             | 4,0%  |
| 21           | 13,4                                 | 0,04%                             | 13,9%                                 | <b>0,1%</b>                             | 3,9%  |
| 22           | 13,3                                 | 0,04%                             | 17,0%                                 | <b>0,1%</b>                             | 4,0%  |
| 23           | 13,2                                 | 0,04%                             | 20,2%                                 | <b>0,1%</b>                             | 3,9%  |
| 24           | 13,1                                 | 0,04%                             | 23,6%                                 | <b>0,1%</b>                             | 4,1%  |
| 25           | 13,0                                 | 0,04%                             | 27,1%                                 | <b>0,1%</b>                             | 4,0%  |
| 26           | 12,9                                 | 0,04%                             | 30,7%                                 | <b>0,2%</b>                             | 4,1%  |
| 27           | 12,8                                 | 0,04%                             | 34,4%                                 | <b>0,2%</b>                             | 4,1%  |
| 28           | 12,7                                 | 0,05%                             | 38,0%                                 | <b>0,2%</b>                             | 3,7%  |
| 29           | 12,5                                 | 0,05%                             | 41,7%                                 | <b>0,2%</b>                             | 3,4%  |
| 30           | 12,4                                 | 0,05%                             | 45,4%                                 | <b>0,3%</b>                             | 3,4%  |
| 31           | 12,3                                 | 0,05%                             | 49,0%                                 | <b>0,3%</b>                             | 3,2%  |
| 32           | 12,2                                 | 0,06%                             | 52,6%                                 | <b>0,4%</b>                             | 3,0%  |
| 33           | 12,0                                 | 0,06%                             | 56,1%                                 | <b>0,4%</b>                             | 3,0%  |
| 34           | 11,9                                 | 0,06%                             | 59,5%                                 | <b>0,4%</b>                             | 2,8%  |
| 35           | 11,7                                 | 0,07%                             | 62,8%                                 | <b>0,5%</b>                             | 2,6%  |
| 36           | 11,6                                 | 0,07%                             | 66,0%                                 | <b>0,5%</b>                             | 2,5%  |
| 37           | 11,4                                 | 0,07%                             | 69,0%                                 | <b>0,6%</b>                             | 2,5%  |
| 38           | 11,3                                 | 0,08%                             | 71,8%                                 | <b>0,6%</b>                             | 2,2%  |
| 39           | 11,1                                 | 0,08%                             | 74,4%                                 | <b>0,7%</b>                             | 2,1%  |
| 40           | 11,0                                 | 0,09%                             | 76,9%                                 | <b>0,8%</b>                             | 2,0%  |
| 41           | 10,8                                 | 0,10%                             | 79,1%                                 | <b>0,8%</b>                             | 2,1%  |
| 42           | 10,6                                 | 0,10%                             | 81,1%                                 | <b>0,9%</b>                             | 2,0%  |
| 43           | 10,5                                 | 0,11%                             | 82,9%                                 | <b>1,0%</b>                             | 1,9%  |
| 44           | 10,3                                 | 0,12%                             | 84,5%                                 | <b>1,0%</b>                             | 2,0%  |
| 45           | 10,1                                 | 0,13%                             | 85,8%                                 | <b>1,1%</b>                             | 1,9%  |
| 46           | 9,9                                  | 0,14%                             | 86,8%                                 | <b>1,2%</b>                             | 1,8%  |
| 47           | 9,7                                  | 0,15%                             | 87,6%                                 | <b>1,2%</b>                             | 1,9%  |
| 48           | 9,5                                  | 0,16%                             | 88,2%                                 | <b>1,3%</b>                             | 1,9%  |
| 49           | 9,3                                  | 0,17%                             | 88,5%                                 | <b>1,4%</b>                             | 1,8%  |
| 50           | 9,1                                  | 0,18%                             | 88,5%                                 | <b>1,5%</b>                             | 1,8%  |
| 51           | 8,9                                  | 0,20%                             | 88,4%                                 | <b>1,6%</b>                             | 1,6%  |
| 52           | 8,7                                  | 0,21%                             | 87,9%                                 | <b>1,6%</b>                             | 1,7%  |
| 53           | 8,5                                  | 0,23%                             | 87,3%                                 | <b>1,7%</b>                             | 1,6%  |
| 54           | 8,3                                  | 0,25%                             | 86,4%                                 | <b>1,8%</b>                             | 1,4%  |
| 55           | 8,1                                  | 0,28%                             | 85,3%                                 | <b>1,9%</b>                             | 1,3%  |
| 56           | 7,9                                  | 0,30%                             | 84,0%                                 | <b>2,0%</b>                             | 1,3%  |
| 57           | 7,6                                  | 0,33%                             | 82,5%                                 | <b>2,1%</b>                             | 1,2%  |
| 58           | 7,4                                  | 0,36%                             | 80,8%                                 | <b>2,2%</b>                             | 1,2%  |
| 59           | 7,2                                  | 0,40%                             | 79,0%                                 | <b>2,3%</b>                             | 1,0%  |
| <b>Total</b> | <b>11,5</b>                          | <b>0,09%</b>                      | <b>54,5%</b>                          | <b>0,64%</b>                            | 100,0%  |

Notes: Absolute measurements are in annual salaries.

Totals are weighted averages by contributors' distribution.

**Annex Table A7**

**Insurance cost of disability pensions and its components. Hypothetical case**

| <b>Age</b>   | <b>Disability Annuity</b> | <b>Relative Wages</b> | <b>Wage-adjusted benefit</b> | <b>Probabil. of invalidating</b> | <b>Insurance Cost</b> | <b>Contributors' distribution</b> |
|--------------|---------------------------|-----------------------|------------------------------|----------------------------------|-----------------------|-----------------------------------|
|              | (a)                       | (b)                   | (c)=(a)*(b)                  | (d)                              | (e)=(c)*(d)           | (f)                               |
| 20           | 18,5                      | 0,825                 | 15,3                         | 0,01%                            | <b>0,10%</b>          | 2,6%                              |
| 21           | 18,3                      | 0,793                 | 14,5                         | 0,01%                            | <b>0,11%</b>          | 2,8%                              |
| 22           | 18,1                      | 0,763                 | 13,8                         | 0,01%                            | <b>0,13%</b>          | 2,7%                              |
| 23           | 17,9                      | 0,733                 | 13,2                         | 0,01%                            | <b>0,14%</b>          | 2,9%                              |
| 24           | 17,7                      | 0,705                 | 12,5                         | 0,01%                            | <b>0,15%</b>          | 2,8%                              |
| 25           | 17,5                      | 0,678                 | 11,9                         | 0,01%                            | <b>0,16%</b>          | 3,0%                              |
| 26           | 17,3                      | 0,652                 | 11,3                         | 0,02%                            | <b>0,18%</b>          | 3,0%                              |
| 27           | 17,0                      | 0,627                 | 10,7                         | 0,02%                            | <b>0,20%</b>          | 3,0%                              |
| 28           | 16,8                      | 0,603                 | 10,1                         | 0,02%                            | <b>0,21%</b>          | 2,8%                              |
| 29           | 16,5                      | 0,580                 | 9,6                          | 0,02%                            | <b>0,23%</b>          | 2,9%                              |
| 30           | 16,3                      | 0,557                 | 9,1                          | 0,03%                            | <b>0,25%</b>          | 2,9%                              |
| 31           | 16,0                      | 0,536                 | 8,6                          | 0,03%                            | <b>0,28%</b>          | 2,9%                              |
| 32           | 15,7                      | 0,515                 | 8,1                          | 0,04%                            | <b>0,30%</b>          | 2,8%                              |
| 33           | 15,4                      | 0,495                 | 7,6                          | 0,04%                            | <b>0,33%</b>          | 2,8%                              |
| 34           | 15,1                      | 0,476                 | 7,2                          | 0,05%                            | <b>0,35%</b>          | 2,8%                              |
| 35           | 14,8                      | 0,458                 | 6,8                          | 0,06%                            | <b>0,38%</b>          | 2,7%                              |
| 36           | 14,4                      | 0,440                 | 6,3                          | 0,07%                            | <b>0,41%</b>          | 2,5%                              |
| 37           | 14,1                      | 0,424                 | 6,0                          | 0,08%                            | <b>0,45%</b>          | 2,4%                              |
| 38           | 13,7                      | 0,407                 | 5,6                          | 0,09%                            | <b>0,48%</b>          | 2,5%                              |
| 39           | 13,3                      | 0,392                 | 5,2                          | 0,10%                            | <b>0,52%</b>          | 2,3%                              |
| 40           | 12,9                      | 0,377                 | 4,9                          | 0,11%                            | <b>0,56%</b>          | 2,2%                              |
| 41           | 12,5                      | 0,362                 | 4,5                          | 0,13%                            | <b>0,60%</b>          | 2,3%                              |
| 42           | 12,1                      | 0,362                 | 4,4                          | 0,15%                            | <b>0,67%</b>          | 2,1%                              |
| 43           | 11,6                      | 0,362                 | 4,2                          | 0,18%                            | <b>0,74%</b>          | 2,2%                              |
| 44           | 11,2                      | 0,362                 | 4,0                          | 0,20%                            | <b>0,82%</b>          | 2,2%                              |
| 45           | 10,7                      | 0,362                 | 3,9                          | 0,23%                            | <b>0,90%</b>          | 2,3%                              |
| 46           | 10,2                      | 0,362                 | 3,7                          | 0,27%                            | <b>0,99%</b>          | 2,2%                              |
| 47           | 9,7                       | 0,362                 | 3,5                          | 0,31%                            | <b>1,08%</b>          | 2,4%                              |
| 48           | 9,1                       | 0,362                 | 3,3                          | 0,35%                            | <b>1,17%</b>          | 2,4%                              |
| 49           | 8,5                       | 0,362                 | 3,1                          | 0,41%                            | <b>1,26%</b>          | 2,5%                              |
| 50           | 7,9                       | 0,362                 | 2,9                          | 0,47%                            | <b>1,35%</b>          | 2,3%                              |
| 51           | 7,3                       | 0,362                 | 2,6                          | 0,54%                            | <b>1,43%</b>          | 2,3%                              |
| 52           | 6,7                       | 0,362                 | 2,4                          | 0,62%                            | <b>1,50%</b>          | 2,4%                              |
| 53           | 6,0                       | 0,362                 | 2,2                          | 0,72%                            | <b>1,55%</b>          | 2,4%                              |
| 54           | 5,2                       | 0,362                 | 1,9                          | 0,83%                            | <b>1,57%</b>          | 2,3%                              |
| 55           | 4,5                       | 0,362                 | 1,6                          | 0,95%                            | <b>1,54%</b>          | 2,2%                              |
| 56           | 3,7                       | 0,362                 | 1,3                          | 1,10%                            | <b>1,46%</b>          | 2,0%                              |
| 57           | 2,8                       | 0,362                 | 1,0                          | 1,26%                            | <b>1,29%</b>          | 2,0%                              |
| 58           | 1,9                       | 0,362                 | 0,7                          | 1,45%                            | <b>1,02%</b>          | 2,0%                              |
| 59           | 1,0                       | 0,362                 | 0,4                          | 1,67%                            | <b>0,61%</b>          | 2,1%                              |
| <b>Total</b> | <b>12,5</b>               | <b>0,487</b>          | <b>6,7</b>                   | <b>0,28%</b>                     | <b>0,64%</b>          | <b>100,0%</b>                     |

Notes: Absolute measurements are in annual salaries.

Totals are weighted averages by contributors' distribution.