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Nepal

Report to the Government

Moving towards a Social Protection Floor in Nepal

An ILO actuarial study for a new pension scheme for all private sector workers and the self-employed

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Executive summary

The Employees Provident Fund Act is expected to be modified to extend membership of the EPF to workers of small enterprises and the self-employed, and to extend benefits to pensions and health care. In that regard, the Employees Provident Fund has requested the technical assistance of the ILO for the design and actuarial valuation of the contemplated pension scheme to be administered by this institution.

Key provisions of the envisaged scheme

Scope. The envisaged scheme provides for old-age pensions and benefits in case of death and invalidity pensions.

Coverage. The scheme covers workers of the private sector. The possibility will be offered to current Employees Provident Fund (EPF) contributors who do not participate in the Civil Service Pension Scheme (CSPS) to merge with the new pension scheme by converting their accumulated EPF balances into pension credits under the new scheme.

Financing. The contribution rate is 20 per cent of insurable earnings, shared equally between the employer and the employee. The maximum insurable earnings are established at five times that of the minimum wage which was (40,000 Nepalese Rupees (NPR) in 2015. It is assumed that the earnings covered by the scheme for contribution and benefit purposes are limited to the basic salary (see relevant section below "basic salary versus total salary").

Old-age benefits. The normal retirement age is 63 with 15 years of contribution. For eligibility purposes, age credits will be granted to persons aged 49 and over at the time of the scheme's introduction. The old-age pension is equal to 1.8 per cent per year of paid contributions, multiplied by the career-average revalorized earnings. The minimum pension is equal to 60 per cent of minimum wage.

Benefits in case of death. Survivors' benefits are payable after five years of contribution. The spouse receives 60 per cent of the old-age pension. The children each receive 20 per cent of the old-age pension (up to 40 per cent for the children combined). In the absence of spouse and children, 70 per cent of the old-age pension is paid to secondary dependents. A funeral grant of NPR 25,000 is also payable.

Invalidity benefits. Disability is defined as the inability to engage in any gainful activity which is likely to be permanent. The invalidity pension is payable after five years of contribution. The amount of the pension is the same as the old-age pension.

Demographic and financial projections of the envisaged scheme

The evolution of coverage under the new pension scheme is highly uncertain. For the purpose of the valuation, it is supposed that:

– the coverage of formal sector workers who are not members of the EPF will increase from 10 per cent to 100 per cent over a period of 10 years (2016-2025);

– for the informal sector workers, coverage will increase from 5 per cent to 50 per cent over a period of 45 years (2016-2060); and

– for the present members of the EPF who are not covered by the CSPS, only those aged 45 and over with less than 10 years of service will be covered.

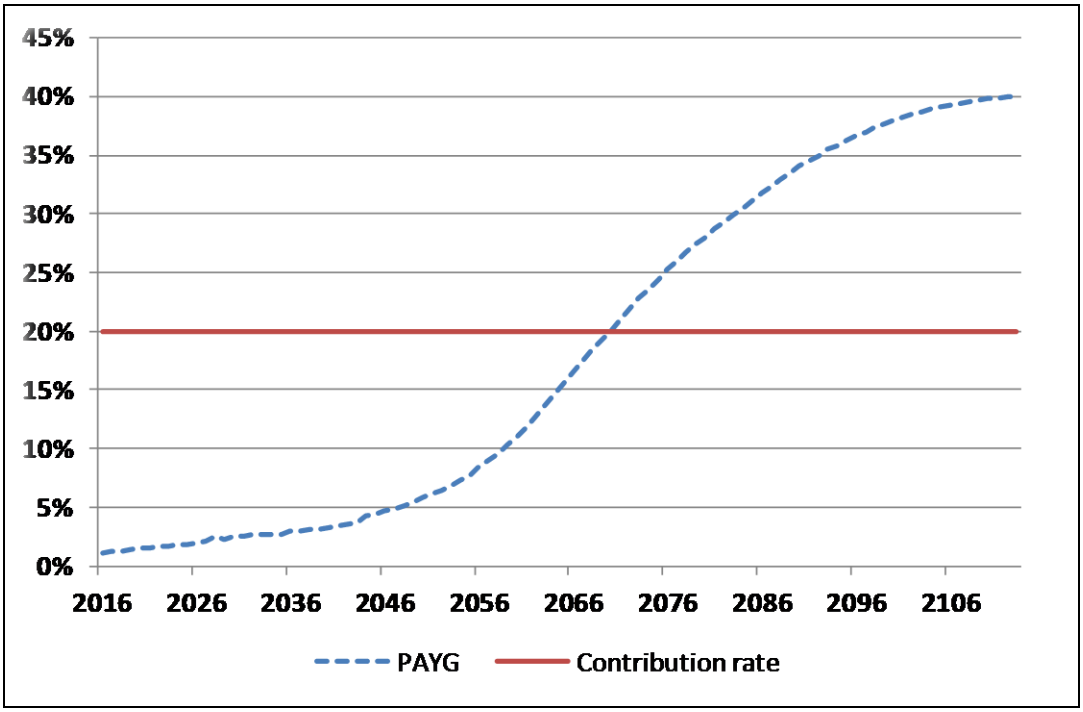
According to these assumptions, the total number of contributors is projected to increase from 283,724 in 2016-17 to 4.3 million in 2060–61, by which time coverage rates will have reached their maturity according to the assumptions of this report.

The cost of a scheme, on a "going-concern" assumption, may be measured by the general average premium (GAP). The GAP represents the constant contribution rate necessary to finance all benefits over a period of 100 years. The GAP is estimated at 20.6 per cent of insurable earnings. This GAP may be compared to the contemplated contribution rate of 20.0 per cent, showing that this contribution rate would be sufficient to finance all benefits of the scheme for the next 100 years.

The pay-as-you-go (PAYG) cost of the scheme represents the contribution rate that would be necessary to finance current annual expenditures in the absence of reserve funds. Because of the maturation process of the scheme, the PAYG starts to increase very slowly until 2060 and reaches 39.8 per cent of insurable earnings at the end of the projection period in 2110 (Figure 1).

The investment income generated by the excess of the contribution rate over the PAYG cost during the first 50 years of the new scheme will compensate for the higher PAYG cost in the longer term, thus maintaining a positive reserve for the next 100 years.

Figure 1. PAYG and contribution rate over time



Financial projections show that the envisaged contribution rate of 20.0 per cent will be sufficient to ensure the financial sustainability of the scheme for several decades. However, the PAYG cost at 39.8 per cent in 2110 reveals that the contribution rate may have to be increased at some point in the future. During the initial stage of application of the scheme, the contribution rate of 20.0 per cent represents a good balance of the need to ensure adequate initial financing, a certain degree of stability of the contribution rate, and the present capacity of employers and workers to support a given level of contributions. This is the combined contribution rate currently paid by employers and employees to the EPF and it appears to

represent a socially acceptable level of contributions. Periodic actuarial reviews will constitute the appropriate tool to measure the adequacy of the contribution rate over time and to recommend adjustments if necessary.

Sensitivity tests

Coverage rate. A sensitivity test based on a very pessimistic assumption has been carried out under which the formal economy – defined in Nepal as being made up of enterprises of ten employees or more – will have coverage limited to the 198,000 private sector workers who are currently members of the EPF (with no further increase), and the informal sector will never participate in the scheme. Under this scenario, the GAP of the scheme would increase from 20.6 to 22.1 per cent and the PAYG rate in 2110-11 would increase from 39.8 to 42.2 per cent. Considering that this sensitivity test is an extreme scenario, it can be concluded that even if the future scheme's coverage influences the results of the valuation, it is not the greatest determining factor.

Salary growth. The base scenario of the valuation uses a real salary growth of 2.2 per cent in the short term gradually decreasing to 1.5 per cent in the long term. A sensitivity test has been done with a long-term real wage increase 1.0 per cent lower than the base scenario. With the lower wage growth assumption, the GAP would increase from 20.6 per cent to 22.7 per cent and the PAYG in 2110-11 would increase significantly from 39.8 per cent to 55.8 per cent.

Rate of return of the fund. It is assumed in the valuation that the short-term rate of return of the fund would be 7.5 per cent, gradually decreasing to the rate of growth of GDP in the long term to around 4.0 per cent. A sensitivity test has been done with a flat 4.0 per cent rate of return. With the lower rate of return, the GAP would increase from 20.6 to 22.1 per cent.

Investment policy

The reserve to be accumulated under the new scheme will represent 13.4 per cent of GDP in 2025 and 84.6 per cent in 2050. The investment policy of the new pension scheme will have to consider:

- **Size of the fund.** A long horizon offers the possibility to access investments that deliver value over a longer timeframe than what is possible for other investors. The pension fund can thus expect a greater return over time than small investors.

- **Capacity to support a higher level of risk.** The long horizon of the pension scheme and the large size of its fund allow a higher proportion of equity investments.

- **Investment opportunities in Nepal.** Investment opportunities may be limited in Nepal and care must be taken, at least initially, to ensure that the pension fund is invested in a productive way. The question of domestic versus foreign investments should also be carefully analysed. If investment opportunities are limited in Nepal, establishing the contribution rate of the pension scheme at a level lower than 20 per cent of covered earnings could be considered.

Basic salary versus total salary

It is assumed in this report that the earnings covered by the scheme for contribution and benefit purposes will be limited to the basic salary, at least initially, mainly because this

represents the actual basis for the determination of contributions under the EPF, and is the most robust existing basis for determining insurable earnings for private sector workers. The envisaged pension formula, in relation to the total remuneration however, would provide an insufficient level of income at retirement according to ILO standards. Consideration should be given to eventually using total remuneration, and not just the basic salary, as the basis for calculating contributions and benefits under the contemplated pension scheme. The extension of covered earnings to the total remuneration (basic salary plus allowances) is desirable so that the scheme can offer a complete earnings' replacement.

Using the basic salary to determine contributions and benefits under the envisaged pension scheme could also encourage employers to limit future increases of the basic salary and to focus on allowances for granting remuneration increases in order to avoid paying contributions on this part of the remuneration. Ideally, benefit adequacy and contribution capacity should be measured with reference to the total salary. The extension of the earnings covered by the scheme should occur at some point in the future.

Alternative scenarios in the global Nepalese social security context

Level of the contribution rate. The contribution rate of the envisaged scheme has been established with reference to the present contribution rate of the EPF and the level of benefit that this contribution rate of 20 per cent can support. In terms of contribution burden and level of benefit, it is considered important to remain equitable (in terms of contribution burden and level of benefit) with regard to EPF members who will continue to contribute to the Fund and those who will join the new pension scheme. Equity must also be preserved towards EPF members who will convert their accumulated Fund balances into pension credits under the new pension scheme.

As establishing the contribution rate for pensions at 20 per cent of this basic salary may leave insufficient space for contributions to other social security schemes, and with investment opportunities possibly limited in Nepal, it could be envisaged to establish the contribution rate of the pension scheme at a level lower than 20 per cent of covered earnings.

Alternative design options. The base scenario of this actuarial valuation uses a normal retirement age of 63 and a pension accrual rate of 1.8 per cent per year of contribution. Table 1 presents the result of the application of different combinations of normal retirement ages and pension accrual rates. For example, it would be possible to reduce the contribution rate around 16 per cent instead of 20 per cent by adopting an accrual rate of 1.5 per cent per year and a normal retirement age of 65.

Table 1. General average premium (GAP) (in percentage)

Normal retirement age	**Pension accrual rate** (per year of contribution)		
	1.5	**1.8**	**2.0**
Age 58	20.7	23.7	25.7
Age 60	19.6	22.7	24.7
Age 63	17.6	**20.6**	22.3
Age 65	**16.5**	19.2	20.7

Consideration of future improvements in life expectancy. Life expectancy at birth is projected to increase significantly in coming decades. The anticipated increases of life expectancy would justify a gradual increase of the normal retirement age over time which would, in turn, reduce the cost of the pension scheme. Based on this, it would be possible to

reduce the contribution rate by introducing an automatic adjustment of the normal retirement age in line with the increase of the life expectancy combined with a lower initial contribution rate. For example, the application of an initial contribution rate of 16 per cent (with a financing policy for the determination of future contribution rate increases), combined with a planned increase of the normal retirement age by five years over the period 2025-2085 would be sufficient to ensure the financial sustainability of the scheme.

This set of measures would reduce the pressure to find important investment opportunities in the short term. Furthermore, it would generate additional space for the introduction of other social security schemes.

Abbreviations and acronyms

CBS	Central Bureau of Statistics
CSPS	Civil Service Pension Scheme
EPF	Employees Provident Fund
GAP	General average premium
GDP	Gross domestic product
ILO	International Labour Office
LFS	Labour Force Survey
NRA	Normal retirement age
PAYG	Pay-as-you-go
TFR	Total fertility rate

Introduction

The Employees Provident Fund Act (EPF) is expected to be modified to extend membership of the EPF to workers of small enterprises and the self-employed, and to extend benefits to pensions and health care. In that regard, the EPF has requested the technical assistance of the ILO for the design and actuarial valuation of the envisaged pension scheme to be administered by this institution.

In addition to the accumulation of contributions that are refunded to the members at termination of employment, the (EPF) currently provides the following benefits: loans (special loans, home loans, educational loans, easy revolving loans), funeral grants, accident compensation, and medical support.

The membership of the EPF is estimated at 490,000 persons. The scheme covers civil servants, the army and the police, employees in the education sector, and certain private corporations and others (private schools, universities, diplomatic missions, NGOs). It means that the present EPF membership is composed of the totality of public sector workers plus approximately 17 per cent of the salaried workers of the formal private sector. Table 1.1 presents the distribution of EPF members by type of employment as of 15 July 2014:

Table 1.1. Distribution of EPF members by type of employment as of 15 July 2014

Type of employment	Number of contributors
Civil servants	91,000
Army	100,000
Police	101,000
Teachers	90,000
Public corporations and private sector	108,000
Total	**490,000**

Participation in the new pension scheme is primarily intended for those in the private sector who do not benefit from pension provisions under their present conditions of employment. Hence the Fund will continue to operate for current EPF members, intended to work as follows:

– Since civil servants, the army and the police are already covered by a pension scheme, they will not participate in the new pension scheme to be administered by the EPF.

– The new pension scheme will apply automatically to new EPF-insured persons from the private sector.

– Persons currently participating in the Fund and who are not participating in the CSPS (employees of public corporations and workers of the private sector) will have the opportunity to choose between continuing to contribute to the Fund or becoming members of the new pension scheme.

It is thought that the new pension scheme will be effective 15 July 2016.

1. Key provisions of the envisaged pension scheme

The recommended provisions of the envisaged pension scheme have been established on the basis of discussions with representatives of the EPF, also considering the provisions of the existing pension scheme covering public sector workers and the ILO Social Security (Minimum Standards) Convention, 1952 (No. 102). The envisaged levels of benefits take into account the intention to keep the cost of the new pension scheme at an affordable level for workers and employers, at least inside the current total contribution rate of 20 per cent presently applicable to the EPF. The rationale behind the choice of certain design parameters presented hereunder is explained in Section 2.

In the context of this report, it is assumed that the scheme will enter into force on 15 July 2016.

1.1. Scope

The envisaged scheme provides for old-age pensions, benefits in case of death and invalidity pensions.

1.2. Persons covered

The scheme covers only workers of the private sector since public sector employees are covered by the CSPS. The intention is to cover persons who are not currently paying contributions to the EPF. However, it is intended to offer the possibility for current EPF contributors who do not participate in the CSPS to merge with the new pension scheme by converting their accumulated balances into pension credits under the new scheme. The period of service recognized under the new pension scheme would be equal to the period of contribution under the fund. [1]

1.3. Financing

Recommended contribution rates are as follows:

Table 1.2. Recommended contribution rates (in percentage)

	Worker	Employer	Total
Contribution rates	10	10	20

Maximum insurable earnings would be equal to five times the minimum wage or NPR 40,000 in 2015.

It is assumed in this report that the earnings covered by the scheme for contribution and benefit purposes will be limited to the basic salary, at least initially. The main reason is the fact that this represents the present basis for the determination of contributions under the EPF. It is also considered that this represents, for the moment, the most robust basis for determining insurable earnings for private sector workers.

[1] This approach appears equitable since the proposed contribution rate under the new pension scheme is the same as the contribution rate under the Provident fund.

1.4. Old-age benefits

Eligibility

Normal retirement is possible at age 63 with 15 years of contribution, paid or credited. Early retirement is possible from age 58 with at least 15 years of contribution. An old-age grant is payable at normal retirement age if the period of contribution is less than 15 years.

For eligibility purposes, age credits will be granted to persons aged 49 and over at scheme's introduction, as follows:

Table 1.3. Age credits for eligibility purposes

Age at scheme's introduction	**Age credit** (years)
49	1
50	2
51	3
52	4
53	5
54	6
55	7
56	8
57	9
58 and over	10

Benefits

The old-age pension is equal to 1.8 per cent per year of paid contributions, multiplied by the career-average revalorized earnings (the method for calculating career-average revalorized earnings is explained in Section 2.2). In case of early retirement, there is a lifetime reduction of six per cent per year before the normal retirement age.

The minimum pension is equal to 60 per cent of minimum wage. The minimum pension is prorated if the number of years of paid contributions is lower than 15 (this applies to persons receiving age credits). The minimum pension is not available in case of early retirement.

The old-age grant is equal to the value of total contributions paid on behalf of the person (by the employee and the employer), accumulated at the rate of interest granted to participants to the EPF Provident Fund.

1.5. Benefits in case of death

Contribution condition for eligibility

Survivors' benefits are payable after 5 years of contribution.

Eligible dependents and benefit amounts

Survivors' benefits are paid in priority to primary dependents (spouse and children), and in the absence of the primary dependents, secondary dependents (all others) are considered; benefits are paid as follows:

– The spouse receives 60 per cent of the old-age pension in payment (or that would have been payable).

The children each receive 20 per cent of the old-age pension (up to 40 per cent for the children combined). Pensions to children terminate when the child reaches the age of 18, or gets married before that age, or until age 21 if attending school.

– In the absence of spouse and children, the total payable is 70 per cent of the old-age pension, distributed to the secondary dependents according to a priority list beginning with parents and followed by brothers, sisters, and others. The parents get 40 per cent and the others 30 per cent of the old-age pension.

Funeral grant

A funeral grant of NPR 25,000 is payable upon death of an insured person.

1.6. Invalidity benefits

Eligibility conditions

Disability is defined as the inability to engage in any gainful activity which is likely to be permanent. The invalidity pension is payable after five years of contribution.

Benefits

The invalidity pension is equal to 1.8 per cent per year of contribution, multiplied by career-average revalorized earnings (same formula as old-age pension). Years of contribution include the period from the inception of invalidity to the normal retirement age. The invalidity pension is payable for life.

1.7. Periodic adjustment of scheme's parameters

The maximum insurable earnings will evolve in line with the increase of the minimum wage.

Pensions in payment and the funeral grant should be indexed annually in line with the Consumer Price Index (CPI).

2. Background for certain design parameters of the envisaged scheme

This section presents the rationale behind the choice of certain design parameters of the envisaged scheme presented in Section 1. Annex 4 compares the different provisions of the envisaged pension scheme with the ILO Convention No. 102 concerning Minimum Standards on Social Security.

2.1. Maximum insurable earnings

Financial projections of this valuation consider an earnings' ceiling equal to five times the minimum wage, equivalent to NPR 40,000 per month. According to ILO Convention No. 102, the earnings' ceiling should cover:

– the average earnings of a skilled manual male employee;

– the earnings of at least 75 per cent of all insured persons;

– at least 125 per cent of the average earnings of insured persons.

There are no data on wages available from the Central Bureau of Statistics (CBS). Salary data are available for EPF members but they cover only the basic salary. On the basis of these data, the criteria of ILO Convention No. 102 can be assessed by considering that the basic salaries of the EPF members also apply to private sector workers and that the basic salary of private sector workers represents, on average, 60 per cent of their total remuneration. On the basis of these assumptions:

– The average monthly salary of male workers (considered here as skilled workers according to the ILO definition) would represent 3.6 times the minimum wage.

– 125 per cent of the average earnings of all insured persons would represent 4.6 times the minimum wage.

– An earnings ceiling equal to 5 times the minimum wage would be above the earnings of 75 per cent of all insured persons.

From these considerations, maximum insurable earnings established at five times the minimum wage would meet the requirements of ILO Convention No. 102.

2.1. Level of the old-age pension and salary base

It is assumed in this report that the earnings covered by the scheme for contribution and benefit purposes will be limited to the basic salary, at least initially, mainly because it represents the actual basis for the determination of contributions under the EPF. It is also considered that this represents the most robust, existing basis for determining insurable earnings for private sector workers.

The envisaged formula for the old-age pension is 1.8 per cent of insurable earnings per year of contribution. This would provide a replacement rate of 54 per cent after 30 years of recognized service. However, this replacement rate is based on basic salary. Considering that the basic salary of private sector workers represents approximately 60 per cent of the

total remuneration, the replacement rate offered by the new pension scheme would be 32.4 per cent of total remuneration after 30 years of recognized service.

The ILO minimum standards of Convention No. 102 provide for a replacement rate of 40 per cent after 30 years of contribution. The envisaged formula would provide an insufficient level of income at retirement according to ILO standards. Consideration should therefore be given to eventually use the total remuneration, instead of the basic salary, as the basis of calculation of contributions and benefits under the envisaged pension scheme. The extension of covered earnings to the total remuneration (basic salary plus allowances) is desirable so that the scheme can offer a complete earnings' replacement.

The use of the basic salary for the determination of contributions and benefits under the pension scheme could also have damaging effects on the whole social security system. It encourages employers to limit future increases of the basic salary and to focus on allowances for granting remuneration increases (to avoid paying contributions on this part of the remuneration). Ideally, benefit adequacy and contribution capacity should be measured with reference to the total salary. The extension of the earnings covered by the scheme should occur at some point in the future.

2.2. Career-average reference earnings

For the calculation of pensions, it is recommended to use average earnings over the whole career of the individual. The suggested method is commonly referred to as the career-average revalorized earnings formula whereby equal weight is given to wages in each year, with older wages revalorized (or indexed) to give them a current value. This method of calculating social security pensions is used in almost all OECD [2] countries. The formula would ensure equity in the following manner:

– Participants with important wage increases towards the end of their career would not receive undue advantage (significantly higher pensions) simply because their final earnings are high.

– Participants with earnings that decline towards the end of their career could be disadvantaged if the formula would use only the earnings over a short period preceding retirement.

– Those who deliberately pay contributions on a low wage for many years, but significantly increase their declared earnings just before reaching the retirement age to obtain a higher pension would have very little extra benefit for doing so under a career-average formula since each year’s contribution is given an equal weight. This may be the case especially with regard to self-employed persons (informal sector) who have more control over their declared earnings.

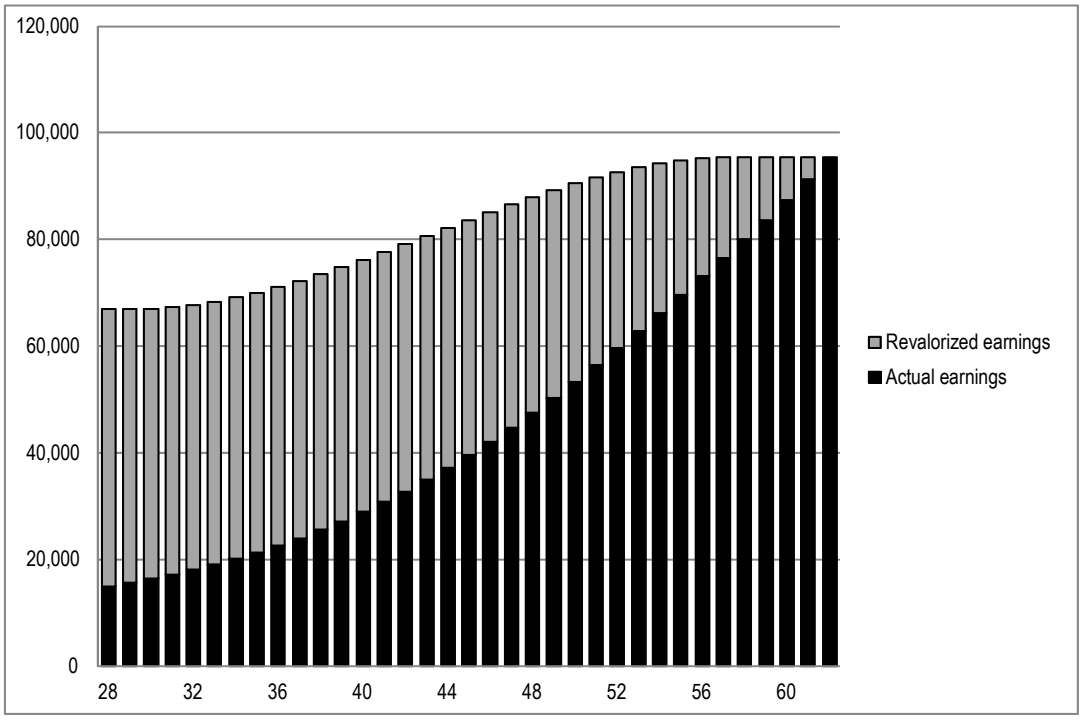
Figure 2.1 presents an example of the application of the career-average revalorized earnings formula whereby the person contributes to the pension scheme for 35 years (from age 28 in 2016 to age 62 in 2050) and retires at age 63 with insurable earnings of NPR 15,000 per month in 2016. The old-age pension starts in 2050. During their career, the earnings of the insured person are assumed to increase on the basis of the salary scale used for this valuation.

The first step consists of adjusting the past insurable earnings of the person. The example illustrates how past earnings would be adjusted in order to give them a 2050 value.

[2] Organisation for Economic Co-operation and Development.

In this revaluation, all the earnings during the career of the individual would be multiplied by a cumulative wage index for the period between the year these earnings were recorded and the year the pension becomes payable. Such a wage index will have to be developed, for example, based on the evolution of the average earnings of persons covered by the EPF or on CBS national wage information.

Figure 2.1. Revaluation of past earnings



The second step is the calculation of career-average revalorized earnings. The sum of monthly revalorised earnings of the whole career is then divided by the total number of months of contribution. In this example, the average career monthly revalorized earnings are equal to NPR 82,523 in 2050.

The third step is the application of the pension rate to the average revalorized earnings. The minimum guaranteed pension is equal to 1.8 per cent of average career monthly earnings, multiplied by the number of months of contribution, divided by 12.

The monthly pension of the person payable in 2050 would be calculated as:

(1.8% x 82,523) x (420 months of contribution / 12) = 51,989

2.4. Normal retirement age, early retirement and age credits

The normal retirement age (NRA) under the envisaged scheme is established at age 63. With regard to the retirement age specified for the scheme, different policy choices can be made in light of the projected evolution of life expectancy, the behaviour of workers in the labour force, and the financial impact of different NRAs. Section 3.5 presents the financial impact of different normal retirement ages.

It may be noted here that the normal retirement age under the CSPS is 58. This is a very low normal retirement age by international standards. The costs presented in Section 3.5 show that a normal retirement age of 58 is not a reasonable option for the pension scheme to be administered by the EPF because of its very high cost.

It is envisaged to allow early retirement from age 58, with an adjustment of pension. A lifetime reduction of 6 per cent per year of early retirement would be applied to the amount of the normal old-age pension. This possibility is offered because of the provisions of the CSPS which allows retirement from 58.

Since the scheme will require at least 15 years of contribution for eligibility to the old-age pension, it would take some time before the first old-age pensions are paid. It is thus envisaged to grant age credits to persons aged 49 and over at the scheme's introduction. These credits would be added to the actual contribution period in order to more quickly meet the minimum requirement of 15 years of contribution. It means that persons aged 58 and below at scheme's inception would become eligible for the old-age pension from age 63 (the normal retirement age), as illustrated in Table 2.1, since they would then reach the minimum contributory period of 15 years when considering their paid and credited contributions. Persons aged 59 and above would need to contribute at least 5 years to become eligible, and so have access to the old-age pension at an age beyond 63.

Table 2.1. Age credits and earliest retirement ages

Age at scheme's introduction	**Age credit** (years)	**First age of eligibility to the normal old-age pension** (to reach 15 years of contribution) *
65	10	70
64	10	69
63	10	68
62	10	67
61	10	66
60	10	65
59	10	64
58	10	63
57	9	63
56	8	63
55	7	63
54	6	63
53	5	63
52	4	63
51	3	63
50	2	63
49	1	63

* Certain current EPF members who will transfer their accumulated rights under the EPF as credits into the new pension scheme could become eligible for the old-age pension at an earlier age.

2.5. Minimum pension

It is proposed that the scheme guarantees a minimum pension equal to 60 per cent of the minimum wage.

The average basic salary of present members of the EPF is NPR 17,494 per month. Hence a person with the minimum requirement of 15 years of contribution to the new scheme who earns the average salary will receive a pension that may be roughly estimated at NPR4,723 (1.8% x 15 x 17,494). This corresponds to 60 per cent of the minimum wage of

NPR 8,000. It means that persons earning less than the average basic salary will receive the minimum pension after paying contributions to the scheme for 15 years (the eligibility condition for the old-age pension).

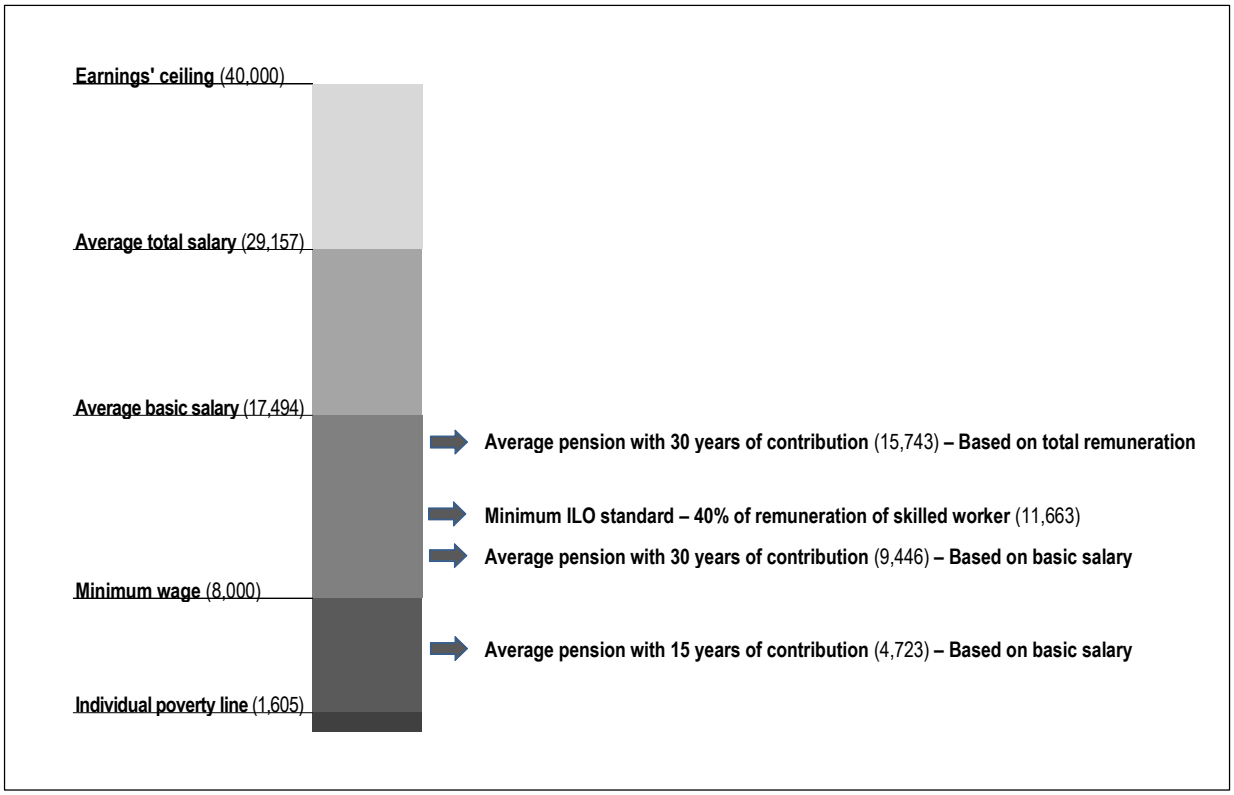
Under the basic scenario of the valuation and a minimum pension established at 60 per cent of the minimum wage, 70 per cent of new old-age pensioners would receive the minimum pension during the first 10 years of application of the scheme. The proportion of new pensioners receiving the minimum pension would then rapidly decrease to 15 per cent over the following 15 years and become almost zero in the long term, as the scheme matures and the period of contribution gradually includes most of the career duration of the individuals.

As a matter of equity, for periods of contribution shorter than 15 years, the amount of the minimum pension should be pro-rated (this applies to persons receiving age credits).

As complementary information, it may be interesting to compare pensions at the minimum level with the poverty line published by the CBS. For 2010-11, the poverty line is established at NPR 19,261 per year (NPR 1,605 per month) for an individual. No information is available on the poverty line for households of two or more people, however, it may be assessed that a minimum pension at 60 per cent of the minimum wage would be sufficient to position a couple out of poverty at retirement.

Figure 2.2 show the relationship between different income sources. In addition, it compares the level of the average pension that would result from a calculation based on basic salary versus total salary. As mentioned above, a replacement rate of 54 per cent after 30 years of recognized service, when applied to the basic salary, would provide a pension of NP 9,446 per month, which represents only 32 per cent of total salary. The same replacement rate of 54 per cent applied to the total salary would result in a pension of NPR 15,743 per month, which is more adequate in relation to the total remuneration.

Figure 2.2. Relationship between different income sources



3. Demographic and financial projections of the scheme

This valuation deals with the ability of the envisaged scheme to meet its future obligations at the time they become due. This is done under an open-group approach. Under this approach, it is assumed that workers will continue to be insured by the scheme indefinitely, thus paying contributions, accruing benefit entitlements, and later receiving benefits in accordance with the legal provisions of the system. Projections are performed over a period of 100 years in order to adequately present the long-term cost of the scheme after reaching a certain level of maturity and with the stabilising of demographic evolution.

This review deals with the revenue and expenditures of the following benefits provided by the scheme: old-age, invalidity, and survivors' pensions as well as the funeral grant. The general methodology of the actuarial review is described in Annex 1. Future contributions and benefits are calculated according to the demographic and economic framework presented in Annex 2, and on the basis of the scheme-specific data and assumptions presented in Annex 3.

Since the valuation concerns a new scheme, no specific social security data were available for establishing most of the actuarial assumptions. In particular:

- **Coverage.** Future coverage under the new pension scheme is highly uncertain. Assumptions about the number of private sector workers who will participate in the new scheme is based on judgement. It considers a gradual increase of coverage that will depend on the attractiveness of the new scheme for workers and employers of the private sector, their capacity to contribute to the scheme, and the administrative capacity of the EPF to register and monitor their participation.

- **Salaries.** Data were available from the EPF on wage levels and the distribution of basic salaries of those currently paying contributions to the EPF. No salary data were available for private sector workers. In addition, no data are available from the CBS on total remuneration, that is, basic salary plus allowances.

- **Density of contributions.** Data from EPF on the density of contributions cannot be directly applied to private sector workers who constitute those to be covered by the new pension scheme.

- **Retirement pattern.** The retirement pattern under the new scheme has been deduced from the observed labour force structure. It must be noted that the introduction of a new pension scheme may affect the retirement pattern or tendency of Nepalese workers.

- **Invalidity incidence.** In the absence of data on invalidity incidence, assumptions had to be based on the experience of other countries.

These limitations of the database have influenced the modelling process and may affect the precision of projections, nonetheless, the main conclusions of the actuarial valuation remain valid.

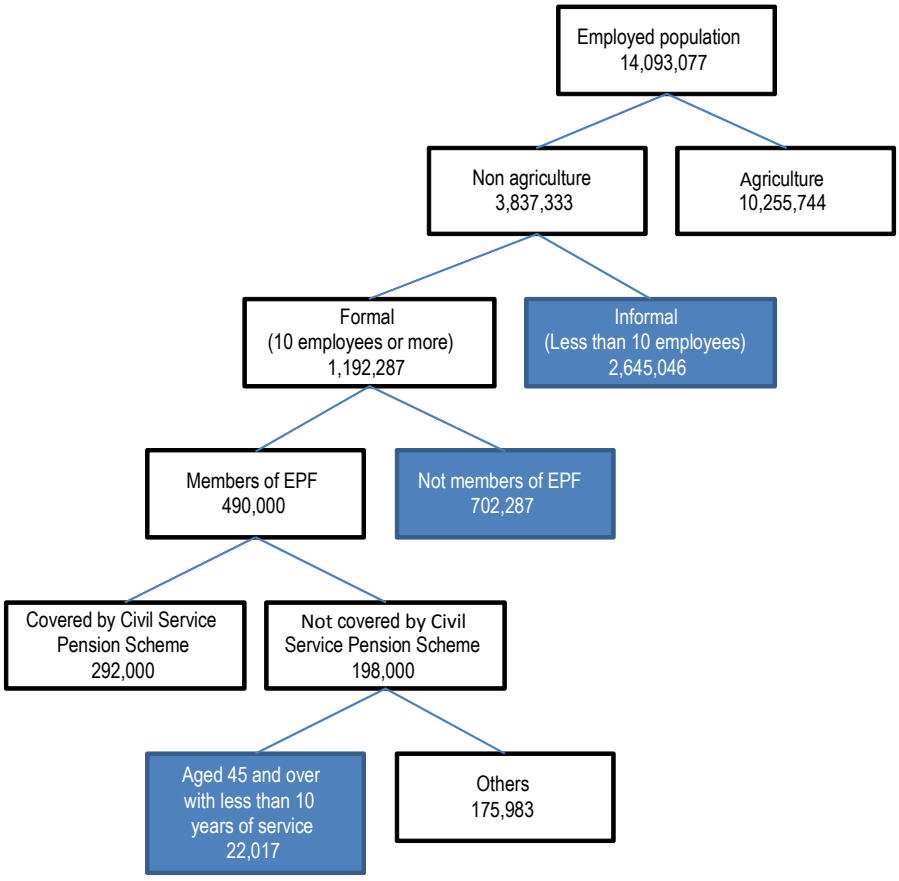
The main purpose of the valuation is to find out whether the suggested financing of the scheme is appropriate, and not to forecast numerical values exactly. Due to the long-term nature of the assumptions, absolute figures contain a high degree of uncertainty; therefore, results should be interpreted carefully, and future actuarial reviews undertaken on a regular basis will allow for possible validation of the assumptions in light of the actual experience.

The base scenario of this valuation considers the provisions of the scheme as described in Section 1. It is presumed that the scheme will enter into force on 15 July 2016.

3.1. Demographic projections

The population of workers to be insured under the new scheme has been projected by establishing, as a first step, a "potential" insured population from the data of the 2008 Labour Force Survey (LFS) and the number of persons who currently contribute to the EPF. It is supposed that this "potential" insured population is composed of: (1) the workers of the formal sector (working in enterprises of 10 employees or more) who are not presently members of the EPF; (2) the workers of the informal sector (working in enterprises of less than 10 employees); and (3) the present members of the EPF who are not covered by the CSPS and who have certain characteristics of age and service that would induce them to switch to the new pension scheme, for example, because of the age credits. These three groups are highlighted in Figure 3.1.

Figure 3.1. Potential insured population under the new pension scheme (2014)



Source: Nepal Labour Force Survey 2008 and authors' calculations.

From this "potential" insured population, it is further presumed that the coverage will grow in a gradual manner, evolving as follows:

– For the 702,287 formal sector workers who are not members of the EPF, coverage would increase from 10 per cent to 100 per cent over a period of 10 years (2016-2025).

– For the 2,645,046 informal sector workers, coverage would increase from 5 per cent to 50 per cent over a period of 45 years (2016-2060).

– For the present members of the EPF who are not covered by the CSPS, who are aged 45 or more with less than 10 years of service (22,017 persons), the coverage would be immediate. It is further presumed that they would convert the totality of their EPF accumulated contributions into credits under the new pension scheme.

The detailed methodology concerning the projection of the covered population and its distribution by age and gender is presented in Section A3.1 of Annex 3. In addition, a sensitivity test on the evolution of the coverage rate is presented in Section 3.5.

On that basis, the total number of contributors will increase from 282,464 in 2016-17 to 4.3 million in 2060-61 (see Table 3.1) at the time coverage rates will have reached their maturity according to the assumptions of this report. Thereafter, the slight decrease of the total Nepalese population and labour force will lead to a consequent decrease of the scheme's insured population in the long term.

The ratio of contributors to pensioners will decrease continuously during the period of projection, as illustrated in the last column of Table 3.1.

Table 3.1. Projected number of contributors and pensioners (2015-2100)

Year	Number of contributors *	Number of pensioners					Ratio of contributors to pensioners
		Old-age	Invalidity	Widows(ers)	Children	Total	
2016	282 464	249	28	39	80	395	714.3
2017	417 777	630	91	133	153	1 007	414.8
2018	562 166	1 103	168	251	184	1 706	329.6
2019	716 222	1 586	256	392	211	2 444	293.0
2020	879 970	2 197	354	556	241	3 348	262.8
2025	1 858 150	10 805	3 250	5 493	5 340	24 888	74.7
2030	2 343 656	21 181	10 648	18 108	18 558	68 494	34.2
2035	2 768 784	32 553	22 606	38 115	37 533	130 806	21.2
2040	3 159 662	45 964	38 208	64 470	50 307	198 949	15.9
2045	3 504 210	68 423	57 933	98 514	53 373	278 243	12.6
2050	3 838 775	147 784	82 201	141 639	50 745	422 370	9.1
2060	4 347 089	630 192	139 524	271 288	50 023	1 091 027	4.0
2070	4 166 843	1 226 357	178 983	485 869	50 295	1 941 504	2.1
2080	3 936 153	1 639 992	197 584	771 223	44 969	2 653 769	1.5
2090	3 717 816	1 907 018	205 639	1 010 249	38 578	3 161 483	1.2
2100	3 517 490	2 045 042	206 128	1 088 179	33 685	3 373 034	1.0

* The number of contributors presented here represents the number of persons who pay at least one contribution during the year. It is different from the number of contributors observed during a given month because the density of contribution is lower than 100%.

3.2. Financial projections

Replacement rates

Apart from being driven by the evolution of the number of beneficiaries, the cost of the scheme will also be affected by the average amount of benefits paid to these persons. One indicator of the evolution of pension amounts is the pensions' replacement ratio (the ratio of the average pension to the average wage of active contributors). Table 3.2 presents replacement ratios of new pensioners in selected years for each type of pension.

The long-term replacement rate of new old-age pensioners is around 44 per cent. The average invalidity pension is higher at 62 per cent (it must be recalled that the scheme would grant contribution credits for the period between the inception of invalidity and the normal retirement age). Replacement rates for widows and widowers stand at a level around half of old-age pensions, which is lower than the 60 per cent of the pension formula for spouses because: (1) in the case of death before retirement, the accumulated service will be lower compared to those who reach the normal retirement age; and (2) in the case of death after retirement, widows' and widowers' pensions are calculated from old-age pensions in payment which have been indexed according to inflation (instead of wage increase) between the retirement age and the age at death.

Table 3.2. Projected replacement ratios of new pensioners (2020-2100) (in percentage)

Year	Old-age	Disability	Widows/widowers	Children
2020	18.5	43.3	12.1	2.9
2030	24.5	53.3	10.4	1.9
2040	30.8	58.8	14.0	2.7
2050	37.2	61.0	18.2	3.6
2060	40.2	62.3	21.8	4.4
2070	44.2	62.2	23.6	4.7
2080	44.1	61.9	23.9	5.0
2090	43.4	62.1	23.5	5.3
2100	43.5	61.9	23.2	5.4

Initial reserve

The initial reserve has been estimated as the value of the accumulated accounts of EPF members – assumed to be those aged 45 and above with less than 10 years of service – who will convert their accumulated EPF balances into the new pension scheme and receive equivalent pension credits. This assumption is realistic since the contribution rate is the same for both the EPF and the new pension scheme (20.0 per cent). Annex 5 presents the financial statements of the EPF with total assets of NPR 169,690 million as of 15 July 2014. On that basis, the starting reserve of the new scheme as of 15 July 2016 associated with members aged 45 and above with less than 10 years of service is estimated at NPR 7.4 billion.

Projection of cash flows and the reserve

Table 3.3 presents financial projections of the pension scheme. It uses a contribution rate of 20.0 per cent of insured earnings which would be sufficient to maintain a positive reserve during the next 100 years.

These financial projections are based on a standard retirement age of 63 and a pension accrual rate of 1.8 per cent per year of contribution. The scheme's costs resulting from the application of different standard retirement ages and pension accrual rates are presented in Section 3.5.

General average premium

The cost of a scheme, on a going-concern basis, may be measured by the general average premium (GAP). The GAP represents the constant contribution rate necessary to finance all benefits over a period of 100 years. The GAP is estimated at 20.6 per cent of insurable earnings. This GAP may be compared to the envisaged contribution rate of 20.0 per cent, showing that this contribution rate would be sufficient to finance all benefits of the scheme for the next century.

Pay-as-you-go rate

Table 3.3 also presents the pay-as-you-go (PAYG) cost of the scheme. It represents the contribution rate that would be necessary to finance current annual expenditures in the absence of reserve funds. Because of the maturation process of the scheme, the PAYG starts to increase very slowly until 2060 and reaches 39.8 per cent of insurable earnings at the end of the projection period in 2110.

Cost of the 2016 cohort of new entrants

An estimate has been made of the value of benefits associated with a cohort of new entrants aged 35 in 2016, close to the average assumed age at entry in the scheme, to see how it compares with the contribution rate proposed for the pension scheme. The GAP associated with these new entrants is 25.5 per cent. We can conclude that the proposed contribution rate of 20.0 per cent is lower than the level that would be necessary for fully funding of the scheme.

Table 3.3. Projected revenue, expenditure, and reserve of the envisaged scheme, 2016-2110 (million NPR)

Year	Contribution rate (in %)	Revenue			Expenditure			Reserve		PAYG (in %)
		Contribution income	Investment income	Total income	Benefits	Administrative expenses	Total expenditure	Amount (year-end)	Reserve ratio (number of times current year's expenditure)	
2016	20	11 717	964	12 681	17	586	603	19 476	32.3	1.0
2017	20	18 525	2 102	20 627	171	926	1 097	39 006	35.6	1.2
2018	20	26 723	3 845	30 568	414	1 336	1 750	67 825	38.8	1.3
2019	20	36 310	6 329	42 638	770	1 815	2 585	107 878	41.7	1.4
2020	20	47 613	9 711	57 325	1 227	2 381	3 607	161 595	44.8	1.5
2025	20	138 984	47 982	186 966	5 636	6 949	12 585	752 089	59.8	1.8
2030	20	239 562	136 943	376 505	17 711	11 978	29 690	2 109 808	71.1	2.5
2035	20	375 586	269 767	645 353	32 834	18 779	51 613	4 574 187	88.6	2.7
2040	20	550 906	439 666	990 572	61 970	27 545	89 515	8 486 616	94.8	3.2
2045	20	770 891	705 504	1 476 395	131 061	38 545	169 605	14 181 261	83.6	4.4
2050	20	1 062 078	1 059 592	2 121 670	251 417	53 104	304 521	22 214 319	72.9	5.7
2060	20	1 884 957	1 980 959	3 865 916	941 763	94 248	1 036 010	46 257 561	44.6	11.0
2070	20	2 824 961	2 836 128	5 661 088	2 692 867	141 248	2 834 115	75 141 437	26.5	20.1
2080	20	4 179 073	4 132 629	8 311 702	5 646 683	208 954	5 855 636	101 316 709	17.3	28.0
2090	20	6 157 254	4 469 251	10 626 505	10 168 259	307 863	10 476 122	115 290 639	11.0	34.0
2100	20	9 079 173	3 689 956	12 769 130	16 799 527	453 959	17 253 486	93 512 236	5.4	38.0
2110	20	13 466 075	527 410	13 993 485	26 119 414	673 304	26 792 718	6 875 195	0.3	39.8

Evolution of the reserve

Figure 3.2 illustrates the difference between the contribution rate of the scheme at 20.0 per cent of insurable earnings and the PAYG cost. It shows that the investment income generated by the excess of the contribution rate over the PAYG cost during the first 50 years of the new scheme will compensate for the higher PAYG cost in the longer term, thus maintaining a positive reserve for the next 97 years.

Figure 3.2. Comparison of the scheme's PAYG and contribution rate (2016-2110)

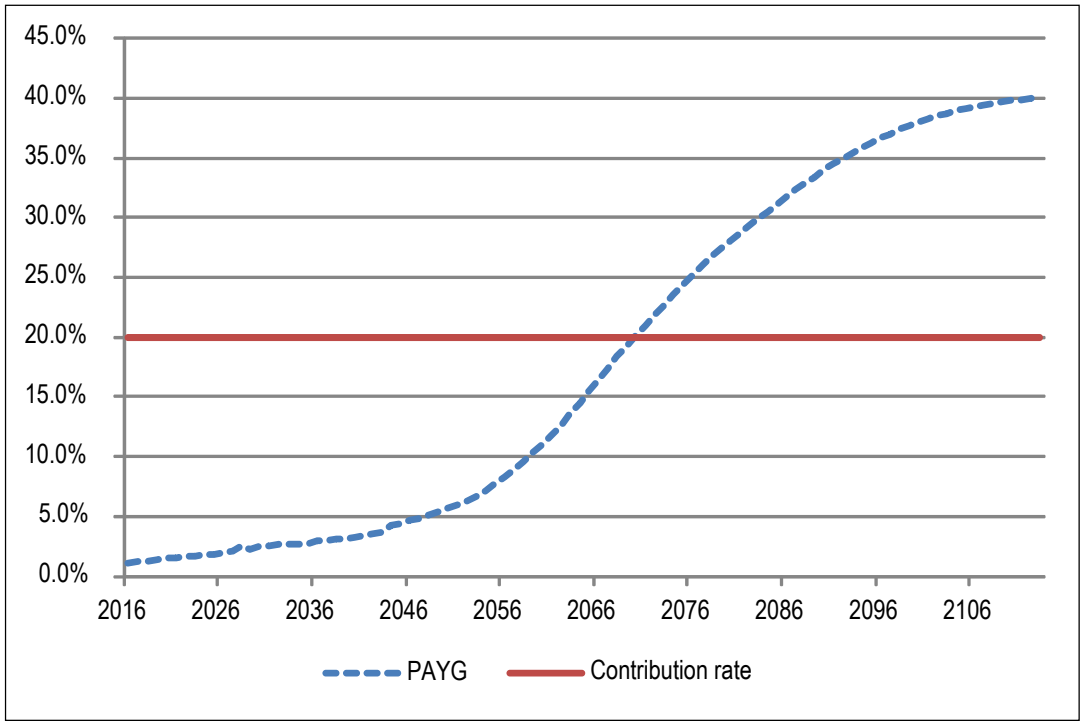


Figure 3.3 shows that while the reserve of the pension scheme will be increasing until 2090, it will start a rapid decreasing trend thereafter (assuming the continuous application of the envisaged contribution rate of 20.0 per cent). This may be explained by referring to Table 3.1 which shows that the demographic ratio will decrease to 1.0 in the longer term (one contributor for each pensioner), and that the PAYG rate of the scheme will reach 39.8 per cent in 2110, which is significantly higher than the proposed contribution rate of 20.0 per cent. The long-term decrease of the reserve may also be explained by the fact that the cost of full funding for a cohort of participants (25.5 per cent for a cohort aged 35 in 2016) is higher than the contribution rate recommended for the scheme.

Figure 3.3. Projected evolution of the reserve of the scheme (2016-2110) (billion NPR)

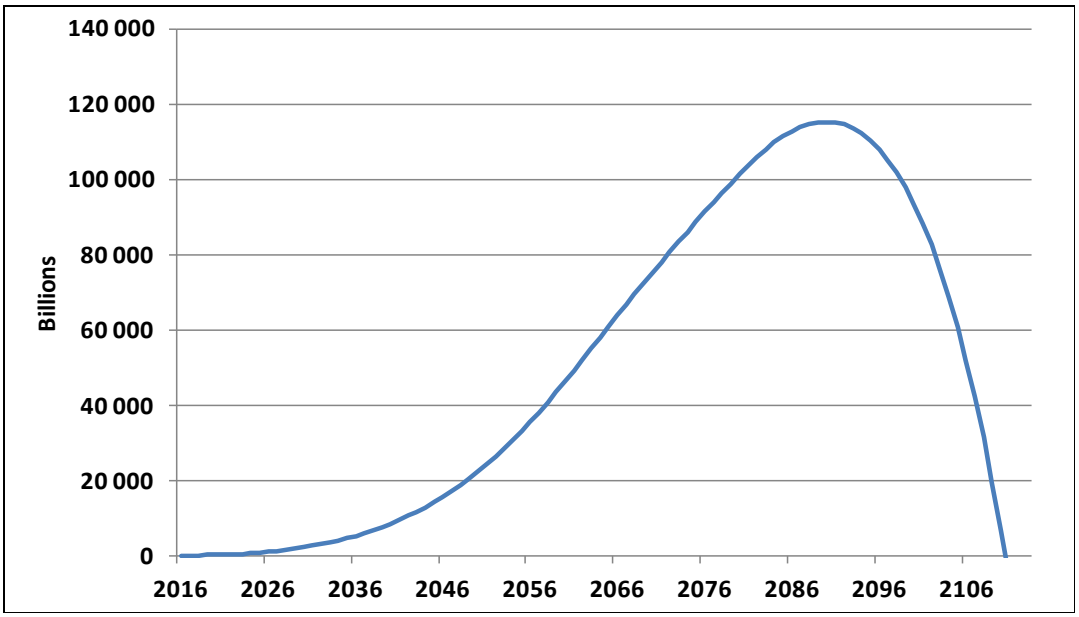
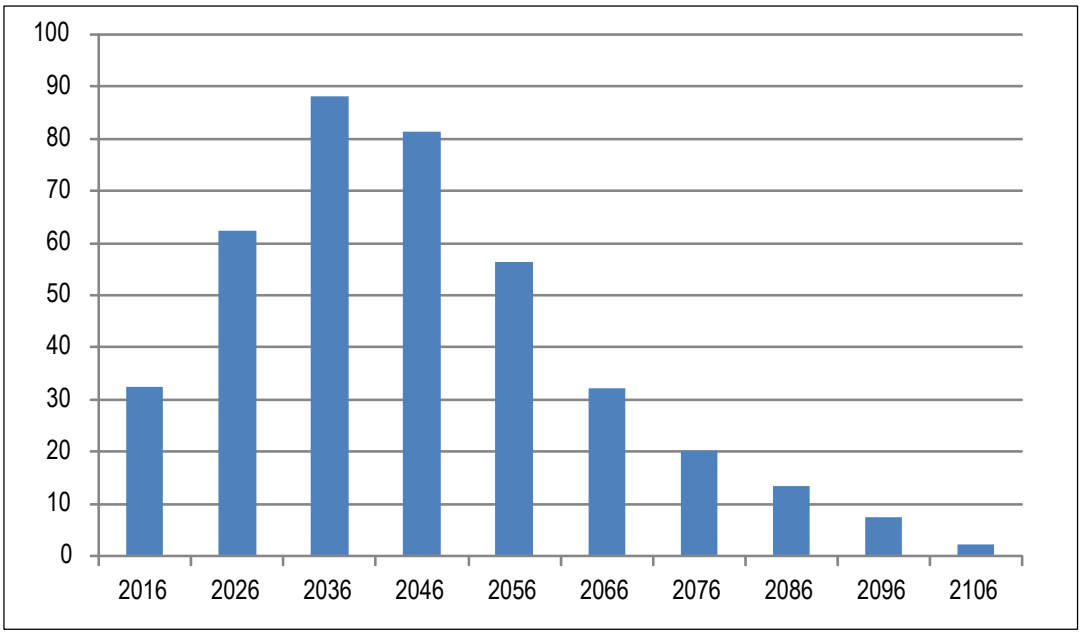


Figure 3.4 illustrates the reserve ratio (ratio of the reserve of the year over the annual expenditure). This ratio is 32.3 in 2016. It reaches 88.2 in 2036 and gradually decreases to zero at the end of the projection period.

Figure 3.4. Projected evolution of the reserve ratio (2016-2106)



Adequacy of the recommended contribution rate

Financial projections show that the envisaged contribution rate of 20.0 per cent will be sufficient to ensure the financial sustainability of the scheme for several decades. However, the PAYG cost at 39.8 per cent in 2110 reveals that the contribution rate may have to be increased at some point in the future. During the initial stage of application of the scheme, the contribution rate of 20.0 per cent represents a good balance between the need to ensure an adequate initial financing, achieve a certain stability of the contribution rate, and taking into account the present capacity of employers, and workers to support a given level of contributions. This is the combined contribution rate being paid by employers and

employees to the EPF and it appears to represent a socially acceptable level of contribution. Periodic actuarial reviews will serve as an appropriate tool to measure the adequacy of the contribution rate over time and to recommend adjustments if necessary.

If the scheme would consider total remuneration instead of the basic salary for the determination of contributions and benefits, the cost of the scheme – and consequently the recommended contribution rate – would not differ significantly from the figures presented above. This is because data are expressed as a percentage of earnings, except in the case of minimum pension. Moreover, in the medium to long term, the minimum pension does not represent a large portion of expenditures.

3.3. Scheme's expenditure and reserve as percentage of GDP

Table 3.4 shows that the scheme will have long maturation, with total pension expenditures increasing very slowly in the initial stage of application of the new scheme. They represent only 0.4 per cent of GDP in 2030 and 1.2 per cent in 2050. The fact that coverage under the scheme is limited to private sector workers, and that this valuation assumes a very gradual increase of the pension coverage, greatly limit the size of the scheme's expenditures in the short term.

The reserve of the scheme will increase rapidly, representing 13.4 per cent of GDP in 2025 and 84.6 per cent in 2050. Given its size, this reserve will have to be invested productively, as discussed in Section 4.1.

Table 3.4. Total expenditures and reserve of the envisaged scheme, as percentage of GDP
(in percentage)

Year	Total expenditures as % of GDP	Reserve of the scheme as % of GDP
2016	0.0	0.8
2017	0.0	1.5
2018	0.1	2.3
2019	0.1	3.3
2020	0.1	4.5
2025	0.2	13.4
2030	0.4	25.8
2035	0.4	39.7
2040	0.6	54.5
2045	0.8	69.7
2050	1.2	84.6

3.4. Investment policy

As shown in Table 3.4, the reserve to be accumulated under the new scheme will increase significantly until 2050. This reserve must be separated clearly from the EPF for accounting and investment purposes. In addition, the investment policy of the new pension scheme will have to consider:

– **Size of the fund.** The asset allocation of a large-scale pension scheme should be established in relation to the timeframe of the system and the size of the fund. Regarding timing, a long horizon offers the possibility to access investments that

deliver value over a period longer than that which is possible for other investments. A large fund also allows investment in both direct, private investments, not only public markets. The pension fund can thus expect a greater return over time than small investments.

– **Capacity to support a higher level of risk.** The long horizon of the pension scheme and the large size of its fund allow a higher proportion of equity investments.

– **Investment opportunities in Nepal.** Investment opportunities may be limited in Nepal and care must be taken, at least initially, to ensure that the pension fund is invested in a productive way. The question of domestic versus foreign investments should also be carefully analysed. It may be appropriate to invest overseas with an intention to diversify the portfolio and seek higher returns but it must also be kept in mind that the pension fund may represent an excellent tool for developing the national economy.

3.5. Sensitivity tests

Projections include an extensive set of demographic, economic and scheme-specific assumptions. Actual experience will inevitably differ from projections. This section analyses alternative assumptions concerning: (1) the future evolution of coverage; (2) the wage growth; and (3) the rate of return of the fund. It presents their effect on the GAP of the scheme and on its long-term PAYG rate.

Coverage rate

The base scenario of the actuarial valuation assumes that the coverage of the formal private sector will increase from 10 per cent in 2016 to 100 per cent in 2026, and that the coverage of the informal sector will increase from 5 per cent in 2016 to 50 per cent in 2061. A sensitivity test has been done based on the very pessimistic assumption that the formal sector coverage will be limited to the 198,000 private sector workers who are now members of the EPF (with no further increase), and that the informal sector will never participate in the scheme. Under this alternative scenario, as show in Table 3.5, the GAP of the scheme would increase from 20.6 per cent to 22.1 per cent. The PAYG rate in 2110-11 would increase from 39.8 to 42.2 per cent. Considering that this sensitivity test is an extreme scenario, it can be concluded that even if the coverage assumption influences the results of the valuation, it is not of greatest impact.

Table 3.5. Sensitivity test on the coverage rate (% of insurable earnings)

Scenario	GAP	PAYG in 2110-11
Base scenario (improves over time)	20.6	39.8
Sensitivity test (no improvement)	22.1	42.2

Salary growth

The base scenario of the valuation uses a real salary growth of 2.2 per cent in the short term gradually decreasing to 1.5 per cent in the long term. With an assumed long term inflation rate of 3.0 per cent, this leads to a long-term nominal wage growth of 4.5 per cent. A sensitivity test has been realised with a long-term real wage increase that is 1.0 per cent lower than the base scenario. Results are presented in Table 3.6. With the lower wage growth assumption, the GAP would increase from 20.6 per cent to 22.7 per cent and the PAYG rate in 2110–11 would increase significantly from 39.8% to 55.8% per cent. It must be considered that this sensitivity test represents an extreme scenario.

Table 3.6. Sensitivity test on the real salary growth (% of insurable earnings)

Scenario	GAP	PAYG in 2110-11
Base scenario (2.2% decreasing to 1.5% in long term)	20.6	39.8
Sensitivity test (1.2% decreasing to 0.5% in long term)	22.7	55.8

Rate of return of the fund

It is assumed in the valuation that the rate of return of the fund would be 7.5 per cent in the short term (corresponding to the return obtained on current EPF investments), gradually decreasing to the rate of growth of GDP in the long term (around 4.0 per cent). A sensitivity test has been realised with a flat 4.0 per cent rate of return. With the lower rate of return, the GAP would increase from 20.6 to 22.1 per cent (see Table 3.7). The PAYG rate is not affected by this assumption because this cost measure does not consider the reserve accumulated under the scheme.

Table 3.7. Sensitivity test on the rate of return of the fund (% of insurable earnings)

Scenario	GAP	PAYG in 2110-11
Base scenario (7.5% decreasing to 4.0%)	20.6	39.8
Sensitivity test (4.0% constant)	22.1	39.8

3.6. Alternative scenarios in the global Nepalese social security context

The design of the pension scheme in this report, and the suggested contribution rate, have been established with reference to the present contribution rate of the EPF and the level of benefit that this contribution rate of 20 per cent can support. It has been considered important to address equitability in terms of contribution burden and level of benefit between EPF members who will continue to contribute to the EPF and those who will join the new pension scheme. Equity must also be preserved regarding EPF members who will convert their accumulated EPF balances into pension credits under the new pension scheme.

On the other hand, establishing the contribution rate for pensions at 20 per cent of this basic salary may leave no space for contributions to other social security schemes which are presently envisaged in Nepal.

Finally, as mentioned in Section 3.4, investment opportunities may be limited in Nepal. It could thus be possible to establish the contribution rate of the pension scheme at a level lower than 20 per cent of covered earnings so that the reserve of the scheme would increase at a slower pace, thus avoiding investments in overly risky developing markets. This section presents alternative design and contribution rate scenarios that would take these factors into consideration.

Alternative normal retirement ages and pension accrual rates

This section presents comparative costs of different provisions of the scheme regarding the normal retirement age and the accrual rate used in the calculation of pensions.

The base scenario of this actuarial valuation uses a standard retirement age of 63 and a pension accrual rate of 1.8 per cent per year of contribution. Additional scenarios retain retirement ages of 58 (corresponding to the average retirement age of the CSPS), 60 and 65. Regarding the pension accrual rate, in addition to the 1.8 per cent accrual rate used in the

base scenario, the scheme's costs are presented with the application of accrual rates of 1.5 per cent and 2.0 per cent. Table 3.8 presents the result, expressed in terms of GAP, of the application of different combinations of standard retirement ages and pension accrual rates.

Results show that the combination of an accrual rate of 2.0 per cent and a normal retirement age of 65 would be equivalent, in terms of costs, to the combination discussed in this report (accrual rate of 1.8 per cent with retirement age of 63). It also shows that for offering a normal pension at age 58, as is the case for civil servants, it would be necessary to reduce the pension accrual rate to 1.5 per cent to stay at the same level of cost.

Table 3.8 also shows that it would be possible to reduce the contribution rate to around 16 per cent by adopting an accrual rate of 1.5 per cent per year and a normal retirement age of 65.

Table 3.8. General average premium (GAP) for different combinations of standard retirement age and pension accrual rate (in percentage)

Standard retirement age	**Pension accrual rate** (per year of contribution)		
	1.5	**1.8**	**2.0**
Age 58	20.7	23.7	25.7
Age 60	19.6	22.7	24.7
Age 63	17.6	**20.6**	22.3
Age 65	**16.5**	19.2	20.7

Consideration of future improvements of life expectancy

Life expectancy at birth in 2011 is estimated at 65.4 years for males and 68.0 years for females; it is projected to increase to 80.9 years for males and 85.0 years for females in 2110. Life expectancy at age 63 which is the standard retirement age under this scheme is 15.1 years for males and 16.3 for females in 2016-, it is projected to increase to 21.6 years for males and 24.7 years for females at the end of the projection period in 2110). These important anticipated increases of life expectancy would justify a gradual increase of the retirement age in order to keep the demographic ratio at a reasonable level and to avoid important future increases of the required contribution rate.

One possibility is to introduce in the scheme an automatic adjustment of the retirement age, aligned with the increase of the life expectancy, with a lower initial contribution rate. For example, the combination of an increase of the retirement age by five years over the period 2025-2085 with an initial contribution rate of 16 per cent would make the pension scheme sustainable for several decades. In that context, the long-term financial sustainability of the scheme would be ensured by the adoption of a financing policy that would establish the method for the determination of contribution rate increases to be applied in the future. [3]

[3] The scaled-premium system of finance, for example, calls for periodic contribution rate increases at determined points in time (for example every 15 years), based on the principle that the reserve must not decrease during that period. This method of financing introduces rigor in the establishment of contribution rates at periodic intervals. It also limits the build-up of pension reserves when the context is not favorable for investments. Other financing rules may also be applied.

Such an approach would have two advantages:

– The reserve of the scheme would be increasing until 2080 but at a slower pace than under the base scenario, thus reducing the pressure to find important investment opportunities in the short run.

– A lower initial contribution rate – the difference between the 20 per cent of the base scenario and the 16 per cent alternative contribution rate – would leave space for the introduction of other social security schemes.

3.7. Periodic actuarial valuations

Regular actuarial valuations should take place every three years in order to assess the financial sustainability of the scheme and to make adjustments, if necessary.

Conclusions

Scheme's design and financial sustainability

The report presents a realistic design for the new pension scheme to be administered by the Employees Provident Fund (EPF), including old-age and invalidity pensions and benefits in case of death. An old-age pension with an accrual rate of 1.8 per cent of career-average earnings per year of contribution, payable at normal retirement age of 63, is a viable option with a contribution rate of 20 per cent of insurable earnings.

Basic salary for the determination of contributions and benefits

It is assumed in this report that the earnings covered by the scheme for contribution and benefit purposes will be limited to the basic salary, at least initially. The main reason is that this represents the present basis for the determination of contributions under the EPF. It is also considered that this represents, for the moment, the most robust basis for determining insurable earnings for private sector workers.

It must be noted, however, that even if the accrual rate of 1.8 per cent per year results in a pension of 54 per cent after 30 years of contribution, using the basic salary for determining pensions may result in pensions lower than those that follow the minimum standards in the relevant ILO Convention No. 102 that take into account full remuneration, not basic, salary alone. It must also be noted that extending covered earnings to reflect total remuneration (basic salary plus allowances) is desirable so that the scheme can offer a complete earnings' replacement. Such an extension of the earnings covered by the scheme should occur in the future.

The use of the basic salary for determining contributions and benefits under the pension scheme could also have adverse effects on the whole social security system. It encourages employers to limit future increases of the basic salary and to focus on allowances for granting remuneration increases. Ideally, benefit adequacy and contribution capacity should be measured in relation to total salary.

Contribution level in the global Nepalese social security context

Establishing the contribution rate for pensions at 20 per cent of the basic salary could leave insufficient space for contributions to other social security schemes. This report presents different combinations of standard retirement age and pension accrual rates that would require lower contribution rates.

It would also be possible to establish the initial contribution rate at a lower level by taking into account future anticipated increases of life expectancy and adopting an automatic increase of the normal retirement age over time. In that context, future planned increases of the contribution rate, supported by a clear financing policy, would ensure the financial sustainability of the scheme in the long term.

Annex 1. Methodology of the actuarial valuation

This actuarial review makes use of the comprehensive methodology developed at the ILO Financial and Actuarial Service for reviewing the long-term actuarial and financial status of national pension schemes. These modelling tools include a population model, an economic model, a labour force model, a wage model, and a pension model.

The actuarial valuation starts with a projection of the future demographic and economic environment of Nepal. Next, projection factors specifically related to the scheme under study are determined and used in combination with the demographic and economic framework.

A1.1. Modelling the demographic and economic environment

The use of the ILO actuarial projection model requires the development of demographic and economic assumptions related to the general population, the economic growth, the labour market, and the increase and distribution of wages. Other economic assumptions relate to the future rate of return on investments, the indexation of benefits and the adjustment of parameters such as maximum insurable earnings.

The selection of projection assumptions takes into account recent experience to the extent that this information is available. The assumptions are selected to reflect long-term trends rather than give undue weight to recent experience.

General population

General population is projected starting with most current data on the general population as obtained from CBS, and applying appropriate mortality, fertility, and migration assumptions.

Economic growth

Increase of the productivity of labour, wage share of GDP, and inflation rates are exogenous inputs to the economic model. Real GDP growth is the result of assumptions on the evolution of the labour force, the employment rate in the labour force, and the productivity of labour.

Labour force, employment, and insured population

The projection of the labour force, that is, the number of persons available for work, is obtained by applying assumed labour force participation rates to the projected number of persons in the general population. Age-specific employment rates are assumed constant in the future. The number of unemployed persons is then calculated as the difference between labour force and the number of employed persons.

The model assumes that there is movement of participants between the groups of active and inactive insured persons.

Wages

Based on an allocation of total GDP to capital income and to labour income, a starting average wage is calculated by dividing total wages in the GDP by the total number of employed persons.

In the medium term, real wage development is checked against the labour productivity growth. In specific labour market situations, wages might grow at a pace faster or slower than productivity. However, due to the long-term perspective of the current review, the real wage increase is assumed to converge with real labour productivity. It is expected that wages will adjust to efficiency levels over time.

Wage distribution assumptions are also needed to simulate the possible impact of the social protection system on the distribution of income, for example, through minimum and maximum pension provisions. Assumptions on the differentiation of wages by age and gender are established as well as assumptions on the dispersion of wages between income groups.

A1.2. Modelling the financial development of the scheme

The present actuarial review addresses all revenue and expenditure components of the pension scheme.

Purpose of pension projections

The purpose of the pension model is twofold. First, it is used to assess the financial viability of the pension scheme or the long-term balance between income and expenditure of the scheme. In case of imbalance, a revision of the contribution rate or the benefit structure is recommended. Second, the model may be used to examine the financial impact of different reform options, thus assisting policy-makers in the design of benefit and financing provisions. More specifically, the pension model is used to develop long-term projections of expenditures and insurable earnings under the scheme, for the purpose of:

- assessing the options to build up a contingency or technical reserve,
- proposing a contribution rate consistent with the funding objective,
- testing how the system reacts to changing economic and demographic conditions.

Pension data and assumptions

Pension projections require the demographic and macro-economic framework already described and, in addition, a set of assumptions specific to the scheme.

As of the valuation date, the database includes the insured population, the distribution of insurable wages of insured persons, and the distribution of past credited service. Data are disaggregated by age and gender.

Scheme-specific assumptions such as the disability incidence rates and the incidence of retirement by age are determined with reference to the scheme provisions and views about the evolution of retirement behaviour.

The projection of the annual investment income requires information about existing assets on the valuation date. A "rate of return" assumption is formulated on the basis of the nature of the scheme's assets, the past performance of the fund, the scheme's investment policy, and assumptions about future economic growth and wage development.

Pension projection approach

Pension projections are performed following a year-by-year cohort methodology. The existing population is aged and gradually replaced by the successive cohorts of participants on an annual basis according to the demographic and coverage assumptions. The projection of insurable earnings and benefit expenditures are then performed according to the economic assumptions and the scheme's provisions.

Pensions are long-term benefits so the financial obligations that a society accepts when adopting financing and benefit provisions for pensions are also long-term. Participation in a pension scheme extends over the whole adult life, either as contributor or beneficiary, meaning up to 70 years for someone entering the scheme at the age of 16, retiring at the age of 65, and dying some 20 or so years later. During their working years, contributors gradually build entitlement to pensions that will be paid even after their death, to their survivors. The objective of pension projections is not to forecast the exact development of income and expenditures of the scheme but to check its financial viability. This entails evaluating the scheme with regard to the relative balance between future revenue and expenditure.

Annex 2. Projected demographic and macroeconomic environment of Nepal

Future income and expenditure of the envisaged scheme are closely linked to changes in the size and age structure of the population, employment levels, economic and wage growth, inflation, and rates of return on investments. Therefore, in order to estimate the future financial developments of the scheme, a projection of Nepal's total population and economic activity is required. Demographic projections provide estimates of the size and composition of the labour force while projections of the gross domestic product (GDP) and the growth of labour productivity are necessary to project the number of workers and their earnings.

Demographic and macroeconomic variables were projected following an analysis of past trends and an estimate of plausible future experience. Population and economic projections are an intermediary step to derive projections specific to the scheme.

A2.1. Population projection

The last official Nepal population census took place in 2011 in which the resident population was estimated at 26,494,504 persons.

Fertility

The total fertility rate (TFR) represents the average number of children each woman of childbearing age would have if she had all her children in a particular year. If there is no migration, a TFR of 2.1 is required for each generation to replace itself. Fertility in Nepal has significantly decreased over the last three decades, from 6.27 children per woman in 1981 to 5.16 in 1991 and 3.25 in 2001. The last census reveals a TFR of 2.52 children per woman in 2011. In line with *United Nations World Population Prospects: The 2012 Revision*, the TFR in Nepal is projected to gradually decrease from its current level to 1.8 in 2051. Sex ratio at birth is projected constant at 1.07.

Table A2.1. Projected fertility rates for Nepal, by age of the mother

Age	2011	2051
15-19	0.41976	0.10688
20-24	0.88364	0.31085
25-29	0.59496	0.42621
30-34	0.33547	0.40998
35-39	0.18749	0.31352
40-44	0.08294	0.17577
45-49	0.01574	0.05678
Total fertility rate	**2.52000**	**1.80000**

Mortality

Life expectancy and improvements in mortality are assumed to occur in accordance with UN estimates. Life expectancy at birth in 2011 is estimated at 65.4 years for males and 68.0 years for females. Mortality improvements are based on the UN medium variant. Under this pattern of mortality improvement, it is projected that in 2051 life expectancy at birth will reach 73.7 years for males and 77.2 years for females. In 2110, life expectancy is projected to be 80.9 years for males and 85.0 years for females.

In addition, life expectancy at age of 63 (the standard retirement age under the scheme) is 15.1 years for males and 16.3 for females in 2016. It is projected to increase to 21.6 years for males and 24.7 years for females at the end of the projection period in 2110.

Migration

Migration has been projected in line with *United Nations World Population Prospects: The 2012 Revision*. Net annual migration for every five years appear in Table A2.2.

Table A2.2. Projected net migration for Nepal

Period	Net migration per year
2011-2014	–80 000
2015-2019	–75 000
2020-2024	–70 000
2025-2029	–60 000
2030-2034	–60 000
2035-2039	–60 000
2040-2044	–60 000
2045-2049	–60 000
2050-2054	–54 000
2055-2059	–48 000
2060-2064	–42 000
2065-2069	–36 000
2070-2074	–30 000
2075-2079	–24 000
2080-2084	–18 000
2085-2089	–12 000
2090-2094	–6 000
2095 +	0

Projected population

Figure A2.1 presents the projected population of Nepal from 2011 to 2111 separated into three age categories: children (0-15), persons who can potentially contribute to the SSF (16-59) and persons aged 60 and over. The evolution of the relative size of each age-group, notably the decrease of the population of children and the increase of the number of persons at pensionable age, illustrates the slow projected ageing of the population of Nepal.

Table A2.3 presents detailed population projections. It is observed that the total population of Nepal will increase by more than 50 per cent over the next 50 years, from 26.5 million in 2011 to 39.5 million in 2061. The number of persons aged 60 and over will grow from 2.0 million in 2011 to 8.6 million in 2061 and 12.2 million in 2101. The population aged 15 to 59 will grow significantly between 2011 and 2051 but will then start a decreasing trend after 2051. Hence the ratio of the number of working-age persons (15-59) to the number of persons aged 60 and over will fall from 7.0 to 2.8 over the next 50 years.

Figure A2.1. Projected population of Nepal, by age groups (2011-2111)

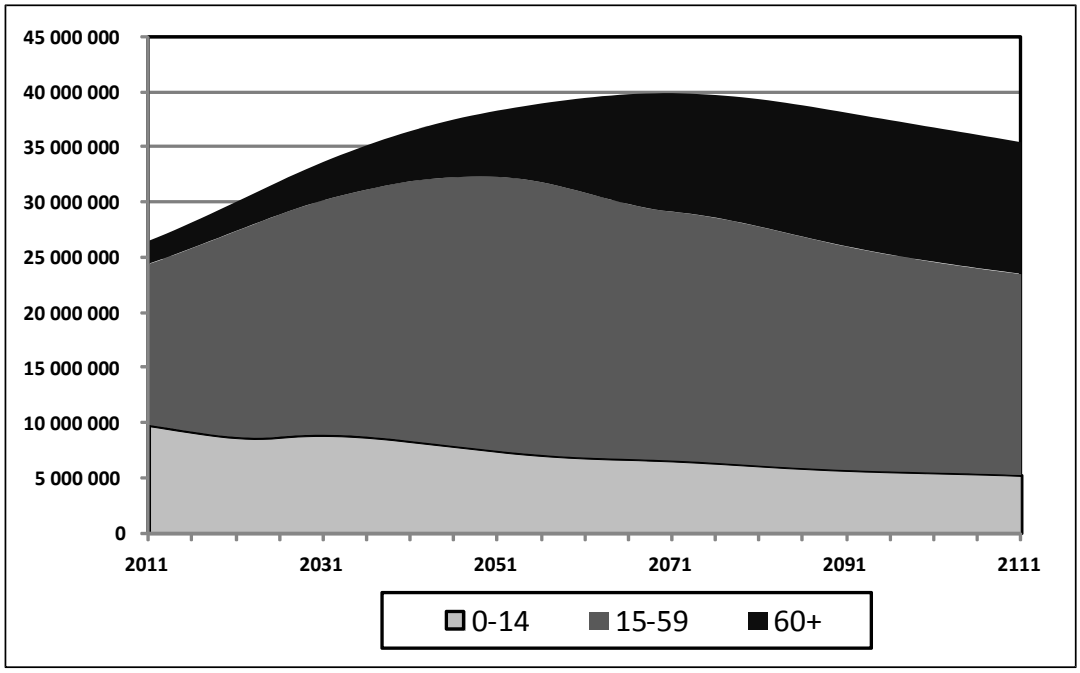


Table A2.3. Projected population of Nepal (2011-2101)

Year	Age				Ratio of persons aged 15-59 to persons aged 60+
	0-14	15-59	60+	Total	
2011	9 860 369	14 556 793	2 077 342	26 494 504	7.0
2021	8 768 289	18 617 612	2 645 312	30 031 213	7.0
2031	8 973 232	21 209 965	3 483 587	33 666 783	6.1
2041	8 408 345	23 507 408	4 573 457	36 489 211	5.1
2051	7 506 577	24 807 556	6 036 215	38 350 349	4.1
2061	6 906 674	23 973 410	8 620 412	39 500 495	2.8
2071	6 633 077	22 522 449	10 774 205	39 929 732	2.1
2081	6 174 584	21 618 216	11 587 397	39 380 197	1.9
2091	5 768 256	20 227 632	12 161 989	38 157 878	1.7
2101	5 544 920	19 047 957	12 219 882	36 812 758	1.6

A2.2. Macroeconomic framework

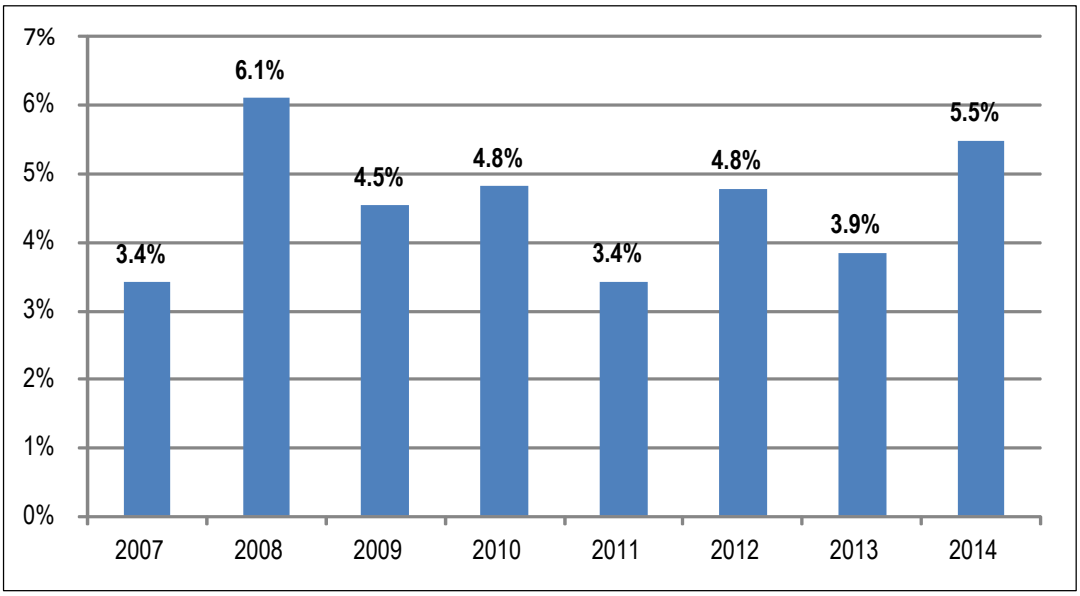
Economic growth

Agriculture production is playing a vital role in Nepal's economic growth but this sector is greatly affected by climatic conditions. Real GDP growth has averaged 4.5 per cent from 2009 to 2014 (see Figure A2.2).

While the growth in the service sector has been satisfactory, the growth of the industrial sector has been greatly influenced by the investment environment, labour problems, energy crisis and prolonged political transition. [4]

[4] Ministry of Finance (Nepal), *Economic Survey, Fiscal year 2013/2014*.

Figure A2.2. Real GDP growth of Nepal (2007-2014)



Source: Central Bureau of Statistics, Nepal.

Agriculture, which accounts for nearly one-third of output, underpins overall GDP growth. Government policies encouraging banks to lend to the agricultural sector will support a strong performance in the sector. Industrial expansion will remain weak, clouded by continued political uncertainty. However, growth in the services sector will continue to outpace the headline rate of GDP growth. Not only will this reflect the role of tourism in the economy, but strong inflows of remittances from Nepalese workers overseas will also contribute to a solid expansion in private consumption spending, boosting retail trade. Efforts to improve the implementation of government spending will be made, and investment spending will accelerate as the political outlook improves. [5]

In line with IMF forecasts, real GDP is projected to increase by 5.0 per cent in 2015, 5.0 per cent in 2016 and 4.5 per cent for 2017, 2018 and 2019. Real GDP growth should gradually decrease over the long term to levels around 1.0 per cent, driven downward by the slower increase of the labour force.

Productivity

Labour productivity is defined as the GDP per employed person. Data indicate that labour productivity growth has been around 2.0 per cent in recent years. On the basis of IMF forecasts, it is projected to be 2.2 per cent on average from 2015 to 2019. It is further assumed to gradually decrease to 1.5 per cent per year in 2040 and stay at that level thereafter.

[5] Economist Intelligence Unit, *Country Report - Nepal, January 2015*.

Table A2.4. Projected GDP growth, productivity and total employment (2015-2100) (in percentage)

Year	Real GDP growth	Increase of the productivity per worker	Increase of the number of workers
2015	5.0	2.4	2.5
2016	5.0	2.5	2.5
2017	4.5	2.0	2.5
2018	4.5	2.1	2.4
2019	4.5	2.1	2.3
2020	4.5	2.2	2.3
2030	3.2	1.9	1.4
2040	2.6	1.5	1.1
2050	2.1	1.5	0.6
2060	1.5	1.5	0.0
2070	0.9	1.5	–0.6
2080	1.1	1.5	–0.3
2090	0.9	1.5	–0.6
2100	0.9	1.5	–0.6

Labour force

The last Labour Force Survey (LFS) in Nepal dates back to 2008. At that time, labour force participation rates were 87.5 per cent for males and 80.1 per cent for females. There appears to be a wide difference, however, between rural and urban labour force participation. While the average rural labour force participation was 86.8 per cent, the urban labour force participation rate was far lower at 67.3 per cent.

The application of the age-specific labour force participation rates and unemployment rates of the 2008 LFS to the population of the 2011 census and the demographic projections of Section 2.1 leads to the projected labour market balance appearing in Table A2.5. It is projected that over the next 50 years, the labour force participation rate will remain high, at around 90 per cent for males and 80 per cent for females, and that the global unemployment rate will remain around 2.0 per cent.

Table A2.5. Labour market balance (2011-2101) (in thousands)

	2011	2021	2031	2041	2051	2061	2081	2101
Total population	26 495	30 031	33 667	36 489	38 350	39 500	39 380	36 813
Male	12 849	14 657	16 528	18 006	19 024	19 710	19 807	18 524
Female	13 645	15 374	17 139	18 483	19 326	19 791	19 573	18 289
Population 15-69	15 821	20 114	23 204	26 034	28 058	28 793	26 249	23687
Male	7 391	9 609	11 219	12 784	14 042	14 700	13 498	12 177
Female	8 430	10 505	11 985	13 251	14 016	14 092	12 751	11 510
Labour force	13 364	16 995	19 855	22 315	23 968	24 406	22240	19 985
Male	6 525	8 445	10 044	11 540	12 689	13 189	12 113	10 891
Female	6 840	8 550	9 811	10 775	11 279	11 217	10 127	9 094
Participation rate (in %)	84.5	84.5	85.6	85.7	85.4	84.8	84.7	84.4
Male	88.3	87.9	89.5	90.3	90.4	89.7	89.7	89.4
Female	81.1	81.4	81.9	81.3	80.5	79.6	79.4	79.0

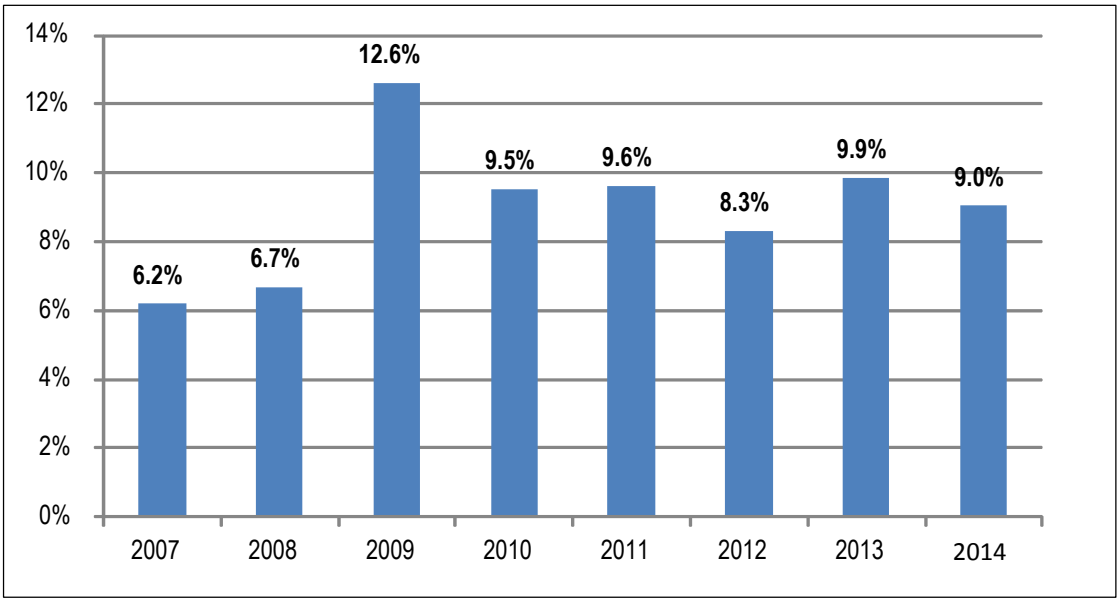
	2011	2021	2031	2041	2051	2061	2081	2101
Employed	13 072	16 617	19 445	21 887	23 542	24 003	21 869	19 653
Male	6 371	8 236	9 813	11 296	12 445	12 959	11 893	10 695
Female	6 702	8 381	9 632	10 591	11 097	11 044	9 975	8 958
Unemployed	297	385	418	439	440	422	372	332
Male	160	216	239	255	258	249	220	196
Female	138	169	179	184	182	173	152	136
Unemployment rate (in %)	2.2	2.3	2.1	2.0	1.8	1.7	1.7	1.7
Male	2.4	2.6	2.4	2.2	2.0	1.9	1.8	1.8
Female	2.0	2.0	1.8	1.7	1.6	1.5	1.5	1.5

Inflation

Over the period 2007 to 2014, the inflation rate averaged 9.0 per cent in Nepal (see Figure A2.3). The inflation rate is projected to moderate, in line with declining Indian inflation (Nepal is dependent on India for a range of imports).

In line with IMF forecasts, it is assumed that inflation will gradually decline from 7.1 per cent in 2015 to 5.8 per cent in 2019. From 2020, the inflation rate is projected to gradually decline to 3.0 per cent in 2040 and to stay at that level thereafter.

Figure A2.3. Inflation rates in Nepal (2007-2014)



Source: Central Bureau of Statistics, Nepal.

Wage increases

In future, the real wage increase is assumed to be equal to the rate of growth of productivity per worker. Hence nominal wage increases are assumed to be gradually decreasing from 9.6 per cent per year in 2015 to 4.5 per cent from 2040 (see Table A2.6), with a real wage increase (above inflation) of 1.5 per cent in the long term.

Table A2.6. Projected inflation rate and wage increase (in percentage)

Year	Inflation rate	Annual nominal increase of average wage
2015	7.1	9.7
2016	6.3	8.9
2017	6.1	8.2
2018	6.0	8.1
2019	5.8	8.1
2020	5.0	7.3
2030	4.0	5.9
2040	3.0	4.5
2050	3.0	4.5
2060+	3.0	4.5

Interest rates

According to IMF, the effective interest rate is around 1.0 per cent. Nepal Treasury bills and interbank rates are close to zero. Commercial banks' deposit and lending rates are 4.2 per cent and 10.8 per cent respectively.

After a tightening of banks' liquidity in late 2012-13, excess liquidity rose again in 2013-14, fueled by remittance inflows and accumulation of government balances in the financial system. This has again pushed interbank and t-bill interest rates to very low levels, and begun to affect retail interest rates. [6]

[6] International Monetary Fund, *Nepal – Staff Report for the 2014 Article IV Consultation-Debt Sustainability Analysis* (June 17, 2014).

Table A2.7. Summary of the main projected demographic and economic variables

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2030	2040	2050	2060	2080	2110
Population, in thousands	26 495	26 815	27 142	27 478	27 827	28 183	28 544	28 910	29 278	29 654	33 334	36 248	38 207	39 410	39 473	35 598
Population (15-69) (in thousands)	15 821	16 234	16 662	17 098	17 541	17 984	18 425	18 859	19 285	19 705	22 918	25 775	27 906	28 790	26 301	22 540
Labour force (15-69) (in thousands)	13 364	13 702	14 052	14 412	14 780	15 152	15 526	15 898	16 267	16 634	19 594	22 095	23 852	24 425	22 285	19 027
Labour force participation rate (in %)	84.5	84.4	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.4	85.5	85.7	85.5	84.8	84.7	84.4
Employed (in thousands)	13 067	13 396	13 737	14 087	14 446	14 809	15 173	15 537	15 897	16 257	19 178	21 658	23 411	24 000	21 911	18 709
Unemployed	297	306	315	324	334	343	352	361	370	378	416	437	441	425	374	317
Unemployment rate (in %)	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.1	2.0	1.8	1.7	1.7	1.7
Employment growth (in %)		2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.3	2.3	1.4	1.1	0.6	0.0	–0.3	–0.6
Productivity growth (in %)	0.0	2.2	1.3	2.9	2.4	2.5	2.0	2.1	2.1	2.2	1.9	1.5	1.5	1.5	1.5	1.5
Real GDP growth (in %)	3.4	4.8	3.9	5.5	5.0	5.0	4.5	4.5	4.5	4.5	3.2	2.6	2.1	1.5	1.1	1.0
Inflation rate (in %)	9.6	8.3	9.9	9.0	7.1	6.3	6.1	6.0	5.8	5.0	4.0	3.0	3.0	3.0	3.0	3.0
Average nominal wage increase (in %)	9.6	10.7	11.3	12.2	9.7	8.9	8.2	8.1	8.1	7.3	5.9	4.5	4.5	4.5	4.5	4.5

Annex 3. Actuarial assumptions specific to the scheme

In addition to the demographic and economic assumptions presented in Annex 2, the projection of the future financial development of the social security scheme requires actuarial assumptions specific to the scheme under study.

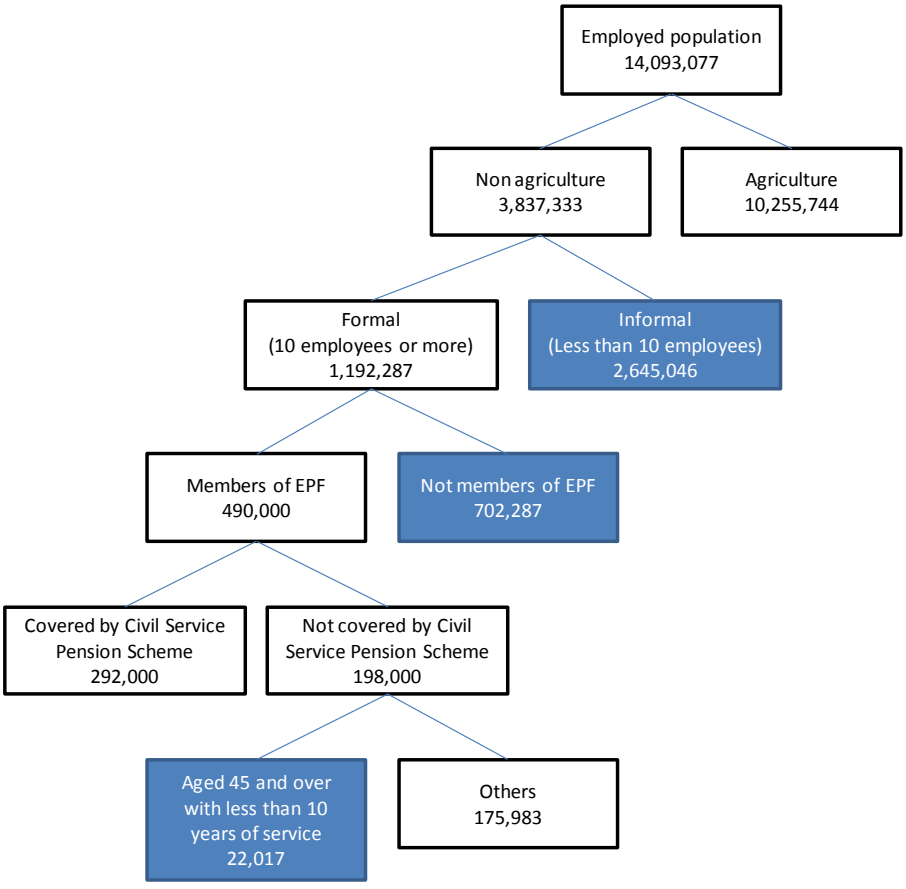
A3.1. Assumptions regarding the insured population

Projected insured population

In projecting the future evolution of the number of persons covered by the new pension scheme, it is important to take into account the extension of coverage to the informal sector that is intended by the amendments to the EPF Act.

The population of workers that will be insured under the new scheme has been projected first by establishing a "potential" insured population from the data of the 2008 LFS and the number of persons who currently contribute to the EPF. It is assumed that this "potential" insured population is composed of: (1) the workers in the formal sector (working in enterprises of 10 employees or more) who are not presently members of the EPF; (2) the workers in the informal sector (working in enterprises of less than 10 employees); and (3) the present members of the EPF who are not covered by the CSPS and who have certain characteristics of age and service that would induce them to switch to the new pension scheme (because of the age credit). These three groups are highlighted Figure A3.1.

Figure A3.1. Potential insured population under the new pension scheme (2014)



Source: Nepal Labour Force Survey 2008 and authors' calculations.

The age and gender distribution of the "potential" insured populations are presented in Tables A3.1 and A3.2.

Table A3.1. EPF members not participating in the CSPS (2013-14)

Age	Male		Female	
	Number	Average monthly salary (NRs)	Number	Average monthly salary (NPR)
15-19	457	15 348	99	15 289
20-24	16 582	15 348	3 147	16 770
25-29	34 035	15 418	6 095	18 128
30-34	41 474	16 033	6 355	19 086
35-39	24 350	17 420	5 944	19 717
40-44	17 962	19 164	5 454	19 997
45-49	15 736	20 659	3 997	20 049
50-54	8 944	21 653	1 753	20 049
55-59	4 137	21 858	789	20 049
60-64	497	21 858	108	20 049
65-69	70	21 858	15	20 049
Total	164 244	17 289	33 756	19 125

Table A3.2. Employed population not contributing to EPF (2013-14)

Age	Non agriculture – Formal		Non agriculture – Informal	
	Male	Female	Male	Female
15-19	64 886	25 059	202 828	123 761
20-24	112 024	60 090	269 816	152 348
25-29	60 347	43 164	267 019	156 592
30-34	30 019	24 772	216 559	114 821
35-39	63 441	20 992	197 743	100 173
40-44	76 546	18 339	191 709	88 852
45-49	20 479	3 800	132 397	47 612
50-54	29 062	5 097	112 215	37 217
55-59	31 423	4 606	90 042	27 773
60-64	3 312	861	45 109	21 586
65-69	3 254	715	33 418	15 454
Total	**494 794**	**207 493**	**1 758 856**	**886 190**

From this "potential" insured population, it is further assumed that the coverage will grow in a gradual manner. It would evolve as follows over the years:

- For the 702,287 formal sector workers who are not members of the EPF, coverage would increase from 10 per cent to 100 per cent over a period of 10 years (2016-2025).
- For the 2,645,046 informal sector workers, coverage would increase from 5 per cent to 50 per cent over a period of 45 years (2016-2060).
- The coverage would be immediate for all current members of the EPF who are not covered by the CSPS and who are aged 45 and above with less than 10 years of participation. It is estimated that 17,630 males and 4,387 females would be included in that group, of the 198,000 EPF members not covered by the CSPS. It is further assumed that they would convert the totality of

their EPF accumulated contributions into credits under the new pension scheme. The assessment of the number of current insured EPF members who will move to the new pension scheme was done by considering:

– the group to which the employee belongs: only private sector and certain teachers will be eligible because the others are covered by the CSPS;

– the age of the person: because of the age credits, persons near the retirement age may have an incentive to move to the new scheme;

– the factors used for the conversion: generous factors will encourage people to move to the pension scheme.

Table A3.3 present the gradual coverage rates applicable to the groups of workers (private sector) that are not currently covered by the EPF.

Table A3.3. Coverage of the groups not currently covered by the EPF (in percentage)

Year	**Private sector** (not agriculture) **– formal**	**Private sector** (not agriculture) **– informal**
2016	10	5
2021	60	10
2026	100	15
2031	100	20
2036	100	25
2041	100	30
2046	100	35
2051	100	40
2055	100	45
2061+	100	50

Salary scale

Table A3.4 presents the salary scales used in the valuation for each gender. These scales were derived from EPF data.

Table A3.4. Salary scales (ratio of salary at a given age to salary at age 15)**, by gender**

Age	Male	Female
17	1.0000	1.0765
22	1.0000	1.2337
27	1.0008	1.3472
32	1.0457	1.4235
37	1.1375	1.4687
42	1.2484	1.4894
47	1.3502	1.4926
52	1.4148	1.4926
57	1.4242	1.4926
62	1.4242	1.4926

Coefficients of variation of salaries have been established at 40 per cent for males and 42 per cent for females, based on the analysis of EPF salary data.

Finally, the actuarial model separates the insured population into three subgroups of earnings: the lowest 30 per cent, a medium range of 40 per cent, and the highest 30 per cent, in order to adequately reflect the impact of minimum and flat-rate benefits.

Density of contributions

Density of contributions represents the average proportion of the year during which contributions are paid under the scheme. Since the average density of contributions under a social security scheme is normally lower than 100 per cent, it means that the number of persons who contribute to the scheme during a given year is larger than the number of actual contributors observed during any month of that year.

Data were available on the density of contributions of EPF members, however, it was considered that the contribution pattern of future participants in the new pension scheme (from the private sector) would be less stable than the pattern of EPF members who are principally working in the public sector where employment is more stable. Hence for this valuation, the density factor has been established at 85 per cent at all ages for both genders. This assumption reflects the general contribution pattern observed under similar social security schemes in other countries. Density of contributions is assumed constant for the whole period of projection.

A3.2. Demographic assumptions related to the scheme

Mortality of insured persons

Mortality rates for the insured population were assumed to be equal to the mortality rates of the general population (sample mortality rates are presented in Table A3.5). Mortality rates were projected to decline continuously during the projection period in line with the assumed increase of the average life expectancy. This mortality pattern is also used to project survivors' benefits payable after the death of insured persons and pensioners. For disability pensioners, it is assumed that mortality rates are equal to five times those of the general population at age 20, decreasing gradually to two times at age 60.

Table A3.5. Sample mortality rates, by age and gender

Age	Male			Female		
	2015	2050	2100	2015	2050	2100
0	0.06091	0.03213	0.01684	0.05798	0.03037	0.01449
5	0.00202	0.00078	0.00037	0.00168	0.00063	0.00029
10	0.00068	0.00029	0.00014	0.00053	0.00020	0.00010
15	0.00058	0.00025	0.00013	0.00045	0.00017	0.00008
20	0.00079	0.00036	0.00018	0.00064	0.00024	0.00012
25	0.00094	0.00043	0.00022	0.00075	0.00029	0.00014
30	0.00120	0.00055	0.00028	0.00093	0.00037	0.00018
35	0.00161	0.00076	0.00039	0.00125	0.00053	0.00026
40	0.00246	0.00124	0.00065	0.00178	0.00081	0.00040
45	0.00401	0.00217	0.00117	0.00274	0.00135	0.00067
50	0.00660	0.00384	0.00213	0.00439	0.00229	0.00114
55	0.01119	0.00705	0.00400	0.00756	0.00413	0.00206
60	0.01797	0.01204	0.00701	0.01279	0.00729	0.00368
65	0.02894	0.02034	0.01223	0.02160	0.01294	0.00670
70	0.04389	0.03196	0.02012	0.03506	0.02218	0.01213
75	0.06495	0.04926	0.03244	0.05585	0.03723	0.02147
80	0.09257	0.07364	0.05083	0.08624	0.06049	0.03676
85	0.13038	0.10910	0.07897	0.12980	0.09701	0.06235
90	0.18616	0.16302	0.12376	0.18848	0.14832	0.10078
95	0.25754	0.23485	0.18704	0.26058	0.21629	0.15600
100	0.33822	0.32038	0.26931	0.34095	0.29882	0.23052

Invalidity incidence rates (natural cause)

Invalidity incidence rates have been based on the experience under the Canada Pension Plan, considering that the type of invalidity recognized under the new EPF pension scheme would be similar to the definition of invalidity applied by the Canada Pension Plan. Invalidity incidence rates appear in Table A3.6.

Table A3.6. Invalidity incidence rates, by age and gender (per 1,000)

Age	Male	Female
25	0.5	0.4
30	0.7	1.0
35	1.1	1.6
40	1.6	2.4
45	2.5	3.3
50	3.9	4.9
55	7.2	7.7
60	11.8	11.0

Retirement behaviour

The actuarial model used for the actuarial valuation considers retirement as the residual element of a series of factors. The macro-economic valuation framework captures the number of people employed each year, by age and gender. For a given age at which retirement is possible under the scheme, the difference between the number of insured persons in two consecutive years (for two consecutive ages) is considered to represent net exits from the labour force. Even if some of these exits may result from death or invalidity, most of the exits from the labour force at those ages are new retirees.

For the purpose of projections, it is assumed that all persons enter retirement at the normal retirement age (NRA). It is further assumed that workers who leave the labour force before the NRA stay inactive until NRA at which time they claim their old-age pension.

Family structure

Information on the family structure of the insured population is necessary for the projection of survivors' benefits. Assumptions have to be established on the probability of being married at death, the average age differential between spouses, the average number of children, and the average age of the orphans. Since the total pension associated with children is shared among them, it is also necessary to establish an assumption on the probability of having at least one child. The applicable family statistics appear in Table A3.7, separately for each gender. Finally, the probability of survival of children has been set equal to 1.0 from age of to age 18 and 0.5 for ages 19 and 20.

Table A3.7. Family statistics

MALES

Age	Probability of having an eligible spouse	Average age of spouse	Average number of children	Average age of children	Proportion with at least one child
17	0.071	16	0.2	0.70	0.193
22	0.420	20	0.8	2.91	0.530
27	0.783	23	1.7	6.31	0.833
32	0.927	28	3.0	9.90	0.915
37	0.963	33	4.4	13.96	0.952
42	0.969	38	5.2	17.51	0.960
47	0.967	43	4.9	19.69	0.954
52	0.959	48	3.7	21.17	0.951
57	0.949	53	2.4	21.45	0.950
62	0.875	58	1.4	21.45	0.705
67	0.875	62	0.8	21.45	0.380
72	0.875	67	0.4	21.45	0.205
77	0.875	71	0.2	21.45	0.110
82	0.875	76	0.1	21.45	0.059
87	0.875	81	0.1	21.45	0.032
92	0.875	86	0.0	21.45	0.017

FEMALES

Age	Probability of having an eligible spouse	Average age of spouse	Average number of children	Average age of children	Proportion with at least one child
17	0.231	18	0.2	0.50	0.159
22	0.723	24	1.1	1.49	0.778
27	0.919	31	2.3	3.86	0.915
32	0.957	36	3.2	6.93	0.952
37	0.956	41	3.6	10.64	0.960
42	0.945	46	3.3	14.79	0.954
47	0.931	51	2.5	18.19	0.951
52	0.902	56	1.7	20.06	0.950
57	0.866	61	0.8	21.45	0.798
62	0.682	66	0.2	21.45	0.218
67	0.682	72	0.0	21.45	0.041
72	0.682	77	0.0	21.45	0.008
77	0.682	83	–	21.45	–
82	0.682	88	–	21.45	–
87	0.682	93	–	21.45	–
92	0.682	98	–	21.45	–

A3.3. Other assumptions

Indexing of pensions in payment

It is supposed that pensions in payment will be indexed annually on the basis of the inflation rate.

Administrative expenses

For the purpose of actuarial projections, administrative expenses are set equal to 5 per cent of contribution income.

Annex 4. Comparison of envisaged design parameters with the requirements of ILO Convention No. 102

A4.1. General

	Envisaged provisions for the new pension scheme to be administered by EPF	Requirements of ILO Convention No. 102
Type of scheme	Defined-benefit (DB) system.	ILO standards are based on the defined-benefit (DB) concept.
Persons covered	Private sector workers. Possible for the present EPF members not covered by the CSPS to convert their rights in the EPF into credits in the new pension scheme.	The persons protected shall alternatively comprise prescribed classes of employees, constituting at least 50% of all employees, or prescribed classes of economically active persons, constituting at least 20% of all residents, or all residents whose means during the contingency do not exceed prescribed limits.
Earnings covered	Basic salary, initially, with an objective to eventually increase the earnings basis for the calculation of contributions and benefits to the basis of total remuneration.	
Ceiling on earnings	5 times the minimum wage	The earnings' ceiling shall cover the average earnings of a skilled manual male employee (alternatively, may be a level higher than the earnings of 75 % of all insured persons or 125% of the average earnings of all insured persons)
Financing	**Contribution rates:** – Employer: 10% – Employee: 10% **Financing mechanisms:** – Partial funding with accumulation of a technical reserve for an orderly financing.	The cost of administering and providing social security benefits shall be borne collectively through insurance contributions or taxation. The total of insurance contributions to be borne by the employees protected shall not exceed 50%.
Regular adjustment of pensions	Annual indexing of pensions and funeral grant in line with CPI	Pensions shall be reviewed following substantial changes in the general level of earnings resulting from substantial changes in the cost of living.
General responsibility of the State	The government shall accept the general responsibility for due provision of benefits and proper administration of the system. It shall ensure, where appropriate, that the necessary actuarial reviews and calculations concerning the financial equilibrium are made periodically.	The government shall accept general responsibility for the due provision of benefits and proper administration of the system. It shall ensure, where appropriate, that the necessary actuarial reviews and calculations concerning the financial equilibrium are made periodically.

A4.2. Old-age pension

	Envisaged provisions for the new pension scheme to be administered by EPF	Requirements of ILO Convention No. 102
Objective of the scheme	To secure replacement of lost earnings during retirement	The contingency covered shall be survival beyond a prescribed age.
Eligibility and qualifying conditions	Age 63 with at least 15 years of contribution Early retirement possible from age 58 with at least 15 years of contribution	Pensionable age shall not be higher than 65 years or such higher age as may be fixed by the competent authority with due regard to the working ability of elderly persons. A reduced old-age benefit shall be paid after at least 15 years of contribution or employment.
Amount of benefit	1.8% per year of paid contributions, multiplied by indexed career-average salary. Note: even if this accrual rate results in a pension of 54% after 30 years of contribution, the fact that the salary used for the determination of pensions is the basic salary and not total remuneration may result in pensions lower than the ILO minimum standards. Minimum pension equal to 60% of minimum wage. Pro-rated if number of paid contributions lower than 15. Not available in case of early retirement. Early retirement with a lifetime reduction of 6% of the pension per year before normal retirement age. Retirement grant payable if not eligible to pension at normal retirement age, equal to the accumulated value of employee and employer contributions plus interest	The amount of old-age benefit payable to a standard beneficiary (skilled manual male employee with wife of pensionable age) after 30 years of contribution or employment shall represent at least 40% of the wage of a skilled manual male employee earned during the same time basis.
Transitional provisions	Age credits, for eligibility purposes, granted to persons aged 45 and over at scheme's introduction.	Reduced benefit shall be payable to insured persons who, by reason only of their advanced age when the new come into force, do not qualify for a pension.

A4.3. Invalidity pension

	Envisaged provisions for the new pension scheme to be administered by EPF	Requirements of ILO Convention No. 102
Objective of the scheme	Inability to engage in any gainful activity which is likely to be permanent	The contingency shall include inability to engage in any gainful activity which is likely to be permanent.
Eligibility conditions	5 years of contribution Payable if the person has not reached the normal retirement age	A reduced invalidity benefit shall be payable at least after 5 years of contribution or employment.
Amount of benefit	Same formula as old-age pension Years of contribution for the purpose of pension calculation include period from invalidity to normal retirement age	The amount of invalidity benefit payable to a standard beneficiary (skilled manual male employee with wife and two children) shall represent at least 40% of the wage of such an employee during the same time basis, after 15 years of contributions or employment.
Duration	Payable for life	The benefit shall be granted throughout the contingency or until an old-age benefit becomes payable.

A4.4. Benefits in case of death

	Envisaged provisions for the new pension scheme to be administered by EPF	Requirements of ILO Convention No. 102
Objective of the scheme	The contingency covered shall include the loss of support suffered by the spouse and children (or secondary beneficiaries in absence of spouse or children) as the result of the death of the breadwinner.	The contingency covered shall include the loss of support suffered by the widow or child as the result of the death of the breadwinner.
Eligibility conditions	5 years of contribution	A reduced survivors' benefit shall be payable at least after 5 years of contribution or employment.
Eligible survivors	Survivors' benefits are paid in priority to primary dependents (spouse and children). In the absence of primary dependents, secondary dependents (all others) are considered. In the absence of spouse and children, the benefit is distributed to the secondary dependents according to a priority list beginning with parents and followed by brothers, sisters and others.	In the case of a widow, the right to benefit may be limited to those who are presumed to be incapable of self-support, and to those who are not engaged in a gainful activity.

	Envisaged provisions for the new pension scheme to be administered by EPF	Requirements of ILO Convention No. 102
Amount of benefit	The spouse receives 60 per cent of the old-age pension in payment (or that would have been payable). The children each receive 20 per cent of the old-age pension (up to 40 per cent for the children combined). In the absence of spouse and children, the total payable is 70 per cent of the old-age pension, distributed to the secondary dependents. The parents get 40 per cent and the others 30 per cent of the old-age pension. Funeral grant: NPR25,000	The amount of survivors' benefits payable to a standard beneficiary (widow of skilled manual male employee with two children) shall represent at least 40% of the wage of such an employee during the same time basis, after 15 years of contributions or employment.
Duration	Pensions to children terminate when the child reaches the age of 18, or gets married before that age, or until age 21 if attending school.	The benefit shall be granted throughout the contingency. Children shall be entitled to a benefit at least up to school-leaving age or age 15.
Suspension of benefit	Pension to the spouse ceases upon remarriage and pension to daughters and sisters ceases upon marriage or remarriage.	Suspension of benefit is possible only as long as the widow is living with a man as his wife.

Annex 5. Financial statements of the EPF

This annex presents the balance sheets and income statements of the financial years 2011-12, 2012–13 and 2013–14 as reported by the EPF.

A5.1. Balance sheets (in million NPR)

	2011-12	2012-13	2013-14
Resources			
Provident Fund	121 440	140 710	163 548
Reserves and surplus	2 971	3 478	4 203
Liabilities	523	592	733
Provisions	819	924	1 206
Total	**125 753**	**145 703**	**169 690**
Uses			
Cash and bank balance	4 739	3 890	7 381
Investments in government bonds	14 951	13 704	14 130
Investments in fixed deposits	23 880	27 800	26 660
Equity investments	2 198	2 174	2 221
Project loans	10 738	15 564	24 862
Members loans	66 632	79 766	91 576
Investments in housing	1	0	0
Investments in fixed assets	372	356	821
Fixed assets	478	481	329
Fixed assets under construction	197	355	2
Miscellaneous assets	1 566	1 614	1 709
Total	**125 753**	**145 703**	**169 690**

A5.2. **Income statements** (in million NPR)

	2011-12	2012-13	2013-14
Interest income	10 522	11 398	14 095
Interest expenses	8 629	9 449	11 519
Net interest income	**1 893**	**1 948**	**2 576**
Other income	**121**	**164**	**237**
Administrative expenses			
Staff expenses	536	538	734
Operating expenses	68	83	100
Depreciation	42	40	55
Bank charges	2	2	2
Total	**647**	**664**	**891**
Profit before provision for loans and investments	**1 368**	**1 449**	**1 922**
Provision on loans and investments	184	108	249
Profit after provision for loans and investments	**1 184**	**1 341**	**1 673**
Prior year income (expense)	9	16	3
Profit before adjustments for loans and investments write-off (write-back)	**1 192**	**1 357**	**1 676**
Expenses (income on loans and investments write off (write-back)	0	(7)	(25)
Net profit	**1 192**	**1 364**	**1 701**