

Malaysia

Technical Note on Potential Reforms and Other Issues Following the Eleventh Actuarial Valuation of the Employees' Social Security Act

Regional Actuarial Services Unit (RAS), DWT for East and South-East Asia and the Pacific, Bangkok ILO Global Employment Injury Programme (ILO/GEIP), Enterprises Department, Geneva



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Introduction

The Social Security Organization (SOCSO) of Malaysia requested the International Labour Organization (ILO) to carry out the review and a Funds-in-Trust agreement was negotiated between the ILO and the SOCSO for the provision of services for carrying out the eleventh actuarial valuation of the ESSS as of 31 December 2019, the first actuarial valuation of the SESSS at the same date and other actuarial work. These actuarial valuations are covered in the reports called *Report to the Government Social Security Organization: the eleventh actuarial valuation of the Employees' Social Security Act as of 31 December 2019 and Report to the Government Social Security Organization: the first actuarial valuation of the Self-Employed Social Security Act as of 31 December 2019.*

As part of the Funds-in-Trust agreement, several reform options and issues related to ESSS and SESSS were requested to be analysed by the ILO as part of the terms of reference between SOCSO and the ILO. Calculations and recommendations related to this are set out in this note which often refers to the analysis performed in the actuarial valuations of the schemes; users of this technical note should review these actuarial reports prior to reading this document.

This note deals with a scenario related to potential changes to SOCSO is related to Act 4. One scenario contemplated by the SOCSO's management is to close Act 4 and to open a new Act with changes in the benefits. The main impacts of the proposed changes are:

- Participants prior to the closure of Act 4 would remain entitled to the same benefit package until they leave the scheme (i.e., retirement, death, invalidity, or end of employment).
- Following the closure of Act 4, a new social security Act would come into force. It would cover the same contingencies as per Act 4 and the benefits would be the same except for the elements below:
 - Pensions payable by SOCSO to disabled members and survivors would stop at age 60 for participants, at the age where the deceased members would have reached 60 or the death of the widow(er)/end of entitlement for orphans, whichever is the earliest.

- Commutation of pensions and contribution refunds are not possible, except for small pension commutation for the EI scheme¹.
- Payments would be made according to a revised schedule of injury.
- In case where a member is entitled to both a EI and IS pension, the total of the payment would be limited to 100 per cent of the insured's average wage.
- Reduction of the daily rate for temporary and permanent disability by 10 per cent for each subsequent accident incurring during the period of one year until reaching the minimum daily rate of 50 per cent.

The report has been structured as follows:

- Section 1 shows the results of the projections of the Employment Injury (EI) branch of ESSS in the context of the proposed closure of Act 4.
- Section 2 shows the results of the projections of the Invalidity Scheme (IS) branch of ESSS in the context of the proposed closure of Act 4.
- Section 3 deals with various items as set out in the Terms of Reference (ToR) between the ILO and SOCSO on the proposed closure of Act 4 and ILO comments on these.
- The appendices contain a summary of key SOCSO contribution and benefit provisions in the light of the proposed closure of Act 4, a description of the methodology used for the valuation, the demographic and macro-economic framework, key data inputs and assumptions related to the calculations and analysis performed in this technical note.

¹ No parameters on commutation of small pensions were provided to the ILO. An arbitrary parameter of 20 percent of incapacity was retained by the ILO as the criteria for automatic commutation of small pension.

Valuation of employment injury benefits of ESSS in the context of closure of Act 4

As stated in the introduction, the closure of Act 4 and the enactment of a new Act on social security is envisioned in Malaysia. Significant changes to the EI scheme will take time to implement. Extensive social dialogue will be required amongst all constituents in order to reach agreement on proposed change and to ensure adequate participation in the new scheme. Considering the social dialogue aspect and the date at which these projections were performed, **the analysis of this chapter assumes that Act 4 will be closed on 31 December 2023 and the new Act will be applicable from 1 January 2024.** It is assumed that no further changes will be made to the scheme from the last valuation date (i.e., 31 December 2019) until the closure of Act 4.

1.1 Introduction: purpose of the valuation

One of the purposes of the valuation is to analyse the impact of the proposed change on the finances of the scheme. This analysis is conducted with due reference to the financial system applied to the individual benefits. The analysis leads to an assessment of whether and to what extent benefit provision is provided within the available financing means, i.e., the contribution rate of 1.25 percent of insurable salaries. Demographic and financial projections are provided for a period of 50 years. The EI scheme was extended to foreign workers in 2019.

1.2 The financial systems for employment injury benefits branch

'Financial system' means the arrangement according to which resources are raised to meet expenditures on benefits and administration. It varies according to the type of benefit, i.e. (a) short-term benefits and (b) long-term benefits.

Short-term benefits

The short-term benefits of the Employment Injury Benefits Branch include medical and rehabilitation benefits, temporary disablement benefits and funeral benefits. The annual expenditure on these benefits in relation to the total insured salary bill is expected to stabilize within a relatively short time after a scheme starts operating. The annual Pay-As-You-Go (PAYG) system (or the annual assessment system) is the financial system applied to these benefits. Under the PAYG system, the contribution rate is set so that the expected contribution income in a given year equals the expected benefit expenditure in that same year plus a small margin to build up a contingency reserve. The purpose of this reserve is to meet unexpected variations in receipts and expenditure. Its target level has been set equal to the six-month average of benefit expenditure over the three most recent years.

Long-term benefits

The long-term benefits include permanent disablement benefits and dependents' benefits which are essentially in the form of pensions for life or up to a specified age under the new Act, although they may be partly or fully commuted to a lump sum under specified conditions under Act4². The rate of pension depends on the insured salary and, in the case of permanent disablement benefits, on the degree of disability, but does not depend on past service of the individual. In contrast to short-term benefits, the annual expenditure on these long-term benefits in relation to the total insured salary bill is expected to grow continuously for several decades until the scheme attains maturity. The capitalized present value of benefit awards in relation to the insured salary bill is expected to stabilize much sooner.

The financial system applied to these benefits is the terminal funding system, sometimes called the system of assessment of constituent capitals. The contribution rate is set such that the expected contribution income in a given year should equal the capitalized present value of the future benefits awarded in that year. In other words, all the new benefits incurred in a year are fully funded during that year. This leads to the build-up of a technical reserve which, in theory, should at any time be equal to the capitalized value of all pensions in payment so long as the assumptions for the calculation hold. A margin is added in order to constitute a contingency reserve for unexpected variations of income and expenditure. The target level of this reserve has been set equal to the six-month average of capitalized present value of benefit awards over the three most recent years.

Administration costs

Administration costs are covered by adding a loading to the sum of contributions rates set for short-term and long-term benefits. The determination of administration costs is described below.

1.3 **Prospective cost analysis**

Demographic and financial projections were carried out according to the methodology and assumptions described in Appendix 2 and Appendix 3. It has been assumed that the incidence and severity of temporary and permanent disablement benefits would remain constant over the projection period. The incidence of deaths is assumed to decrease more slowly than the mortality from all causes. Assumptions used in the context of the new Act are the same as under Act 4.

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² Constant attendance allowances (CAA) are normally considered long term benefits however SOCSO accounting practice treats them as short-term benefits. This projection applies SOCSO accounting practice.

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Table 1.1, 1.2 and 1.3 present the demographic projections for the long-term benefits (number of disablement and survivors' pensioners at the end of each year) and the temporary disablement benefits for participants in the Act 4, the new Act, and all Acts respectively. The demographic ratio is the ratio of the number of pensioners to the number of active insured at risk. The latter is obtained by multiplying the number of active contributors by the density factor.

► Table 1.1 Demographic projections of employment injury benefits branch – Act 4 only (Stock of pensioners and temporary disablement)

Year			% per active insured						
	Average	Average Dependents			Dependents				
	number of contributors ¹	PD pensions	Widow (ers)	Other dependents	TDB	PD pensions	Widow (ers)	Other dependents	TDB
2020	7,050,643	23,900	15,743	28,815	86,295	0.34	0.22	0.41	1.22
2021	7,202,719	24,626	16,306	30,962	87,975	0.34	0.23	0.43	1.22
2022	7,326,607	25,344	16,864	31,821	89,465	0.35	0.23	0.43	1.22
2023	7,441,536	26,067	17,423	32,457	90,859	0.35	0.23	0.44	1.22
2024	7,318,290	26,793	17,982	34,001	89,358	0.37	0.25	0.46	1.22
2025	7,191,758	27,505	18,534	35,435	87,830	0.38	0.26	0.49	1.22
2026	7,057,405	28,189	19,071	36,697	86,213	0.40	0.27	0.52	1.22
2027	6,917,053	28,846	19,596	37,660	84,525	0.42	0.28	0.54	1.22
2028	6,768,229	29,480	20,108	38,363	82,743	0.44	0.30	0.57	1.22
2029	6,613,618	30,090	20,607	38,791	80,906	0.45	0.31	0.59	1.22
2034	5,804,687	32,765	22,844	38,217	71,866	0.56	0.39	0.66	1.24
2039	4,904,055	34,752	24,519	33,066	60,710	0.71	0.50	0.67	1.24
2044	3,851,831	35,919	25,520	24,609	48,143	0.93	0.66	0.64	1.25
2049	2,771,836	36,026	25,820	18,396	34,846	1.30	0.93	0.66	1.26
2059	1,012,375	32,468	24,123	6,179	12,715	3.21	2.38	0.61	1.26
2069	132,002	24,600	19,485	1,063	1,650	18.64	14.76	0.81	1.25

1 Average number of contributors: active contributors \boldsymbol{x} density

PD = Permanent Disability ; TDB = Temporary Disability Benefit

Year			% per active insured						
	Average	Average Dependents				Dependents			
	number of contributors ¹	PD pensions	Widow (ers)	Other dependents	TDB	PD pensions	Widow (ers)	Other dependents	TDB
2020	0	0	0	0	0	N/A	N/A	N/A	N/A
2021	0	0	0	0	0	N/A	N/A	N/A	N/A
2022	0	0	0	0	0	N/A	N/A	N/A	N/A
2023	0	0	0	0	0	N/A	N/A	N/A	N/A
2024	228,968	0	0	0	2,796	0.00	0.00	0.00	1.22
2025	452,174	11	3	58	5,522	0.00	0.00	0.01	1.22
2026	674,457	45	12	227	8,239	0.01	0.00	0.03	1.22
2027	894,929	103	26	500	10,936	0.01	0.00	0.06	1.22
2028	1,117,486	186	45	867	13,662	0.02	0.00	0.08	1.22
2029	1,341,212	292	72	1,319	16,407	0.02	0.01	0.10	1.22
2034	2,456,751	1,213	346	4,381	30,416	0.05	0.01	0.18	1.24
2039	3,544,238	2,797	942	7,779	43,876	0.08	0.03	0.22	1.24
2044	4,604,981	5,009	1,897	11,437	57,557	0.11	0.04	0.25	1.25
2049	5,614,894	7,890	3,153	15,717	70,587	0.14	0.06	0.28	1.26
2059	7,077,361	16,167	6,704	23,547	88,887	0.23	0.09	0.33	1.26
2069	7,642,904	21,207	8,756	24,160	95,558	0.28	0.11	0.32	1.25

► Table 1.2 Demographic projections of employment injury benefits branch – New Act only (Stock of pensioners and temporary disablement)

1 Average number of contributors: active contributors x density

PD = Permanent Disability ; TDB = Temporary Disability Benefit

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Year	Numbers					% per active insured				
	Average	Average Dependents				Dependents				
	number of contributors ¹	PD pensions	Widow (ers)	Other dependents	TDB	PD pensions	Widow (ers)	Other dependents	TDB	
2020	7,050,643	23,900	15,743	28,815	86,295	0.34	0.22	0.41	1.22	
2021	7,202,719	24,626	16,306	30,962	87,975	0.34	0.23	0.43	1.22	
2022	7,326,607	25,344	16,864	31,821	89,465	0.35	0.23	0.43	1.22	
2023	7,441,536	26,067	17,423	32,457	90,859	0.35	0.23	0.44	1.22	
2024	7,547,257	26,793	17,982	34,001	92,154	0.36	0.24	0.45	1.22	
2025	7,643,931	27,517	18,537	35,493	93,352	0.36	0.24	0.46	1.22	
2026	7,731,862	28,234	19,083	36,924	94,452	0.37	0.25	0.48	1.22	
2027	7,811,982	28,950	19,622	38,160	95,461	0.37	0.25	0.49	1.22	
2028	7,885,715	29,665	20,153	39,231	96,405	0.38	0.26	0.50	1.22	
2029	7,954,830	30,383	20,678	40,110	97,313	0.38	0.26	0.50	1.22	
2034	8,261,438	33,978	23,190	42,598	102,282	0.41	0.28	0.52	1.24	
2039	8,448,293	37,549	25,460	40,846	104,585	0.44	0.30	0.48	1.24	
2044	8,456,812	40,928	27,417	36,046	105,700	0.48	0.32	0.43	1.25	
2049	8,386,729	43,916	28,972	34,113	105,433	0.52	0.35	0.41	1.26	
2059	8,089,736	48,635	30,827	29,726	101,601	0.60	0.38	0.37	1.26	
2069	7,774,906	45,807	28,241	25,223	97,208	0.59	0.36	0.32	1.25	

► Table 1.3 Demographic projections of employment injury benefits branch – All Acts (Stock of pensioners and temporary disablement)

1 Average number of contributors: active contributors x density

PD = Permanent Disability ; TDB = Temporary Disability Benefit



Figure 1.1 Ratio of pensioners to active members – Comparison of base scenario with scenario of closure of Act 4

Figure 1.1 shows the impact of limiting the pension entitlement after reaching the retirement age. However, it shows clearly that it is a long-term change that will begin to have impact very late into the projection period.

Table 1.4, 1.5 and 1.6 presents another set of demographic projections related to newly awarded benefits in each year for Act 4 only, the new Act and all Acts respectively.

Year	Average	PD pensions ²	PD Lump	D	ependents	Funeral
	number of contributors ¹		sums ³	Widow (ers)	Other dependents	benefits
2020	7,050,643	1,211	25,939	709	2,534	1,318
2021	7,202,719	1,210	25,958	710	2,481	1,297
2022	7,326,607	1,233	26,508	720	2,491	1,305
2023	7,441,536	1,256	27,034	730	2,488	1,308
2024	7,318,290	1,278	27,537	740	2,483	1,309
2025	7,191,758	1,266	27,491	734	2,360	1,250
2026	7,057,405	1,258	27,434	732	2,243	1,199
2027	6,917,053	1,250	27,334	730	2,132	1,152
2028	6,768,229	1,244	27,188	728	2,029	1,110
2029	6,613,618	1,237	26,997	725	1,938	1,070
2034	5,804,687	1,196	25,466	692	1,612	918
2039	4,904,055	1,139	22,931	630	1,355	799
2044	3,851,831	1,038	19,194	561	1,049	694
2049	2,771,836	874	14,639	479	713	583
2059	1,012,375	430	5,927	274	190	331
2069	132,002	91	803	66	15	83

► Table 1.4 Demographic projections of employment injury benefits branch – Act 4 only (Newly awarded pensions and funeral benefits in each year)

1 Average number of contributors: active contributors x density

2 Includes all new pensions awarded including those for which part of them is commuted to a lump sum

3 Includes all lump sums with a degree of incapacity below 20% (excludes the number of lump sums related to the commutation of a newly awarded pension)

Year	Average	PD pensions ²	PD Lump	D	Funeral	
	number of contributors ¹		sums ³	Widow (ers)	Other dependents	benefits
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
2024	228,968	0	0	0	0	0
2025	452,174	23	464	7	116	58
2026	674,457	46	950	12	224	107
2027	894,929	70	1,468	18	324	150
2028	1,117,486	95	2,012	24	416	187
2029	1,341,212	121	2,580	31	495	221
2034	2,456,751	255	5,775	83	788	357
2039	3,544,238	396	9,437	158	999	470
2044	4,604,981	547	13,470	231	1,198	564
2049	5,614,894	725	17,815	301	1,411	651
2059	7,077,361	1,106	25,228	430	1,656	779
2069	7,642,904	1,320	28,350	503	1,607	862

► Table 1.5 Demographic projections of employment injury benefits branch – New Act only (Newly awarded pensions and funeral benefits in each year)

1 Average number of contributors: active contributors x density

2 Includes all new pensions awarded including those for which part of them is commuted to a lump sum

3 Includes all lump sums with a degree of incapacity below 20% (excludes the number of lump sums related to the commutation of a newly awarded pension)

Year	Average	PD pensions ²	PD Lump	D	Funeral	
	number of contributors ¹		sums ³	Widow (ers)	Other dependents	benefits
2020	7,050,643	1,211	25,939	709	2,534	1,318
2021	7,202,719	1,210	25,958	710	2,481	1,297
2022	7,326,607	1,233	26,508	720	2,491	1,305
2023	7,441,536	1,256	27,034	730	2,488	1,308
2024	7,547,257	1,278	27,537	740	2,483	1,309
2025	7,643,931	1,289	27,956	741	2,476	1,309
2026	7,731,862	1,304	28,384	744	2,466	1,306
2027	7,811,982	1,320	28,802	748	2,455	1,302
2028	7,885,715	1,340	29,200	753	2,444	1,297
2029	7,954,830	1,358	29,577	756	2,433	1,291
2034	8,261,438	1,451	31,241	775	2,400	1,274
2039	8,448,293	1,535	32,368	788	2,354	1,269
2044	8,456,812	1,584	32,664	792	2,247	1,258
2049	8,386,729	1,599	32,454	781	2,124	1,234
2059	8,089,736	1,536	31,155	704	1,846	1,110
2069	7,774,906	1,411	29,153	569	1,623	945

► Table 1.6 Demographic projections of employment injury benefits branch – All Acts (Newly awarded pensions and funeral benefits in each year)

1 Average number of contributors: active contributors x density

2 Includes all new pensions awarded including those for which part of them is commuted to a lump sum

3 Includes all lump sums with a degree of incapacity below 20% (excludes the number of lump sums related to the commutation of a newly awarded pension)

Table 1.7 presents the financial projections of employment injury benefits according to the financing system applicable for each of them.

► Table 1.7 Financial projections of employment injury benefits – All Acts (MYR million) (costs reported according to the funding method)

Year	Insured salary bill	isured PD arv bill pensions	PD Dep		ndents	Funeral	TD	Other ¹	Total	Total as % of
	Salary Dill	pensions	sums	Widow (ers)	Other dependents	Schents				insured salary bill
2020	186,804	138	572	196	120	3	281	81	1,389	0.74
2021	202,450	134	559	189	114	3	303	87	1,389	0.69
2022	219,032	145	605	203	121	3	327	94	1,497	0.68
2023	238,587	156	655	218	128	3	356	102	1,619	0.68
2024	259,346	170	713	237	137	3	387	111	1,758	0.68
2025	281,469	184	772	253	145	4	420	121	1,900	0.68
2026	303,759	200	835	272	154	4	454	130	2,050	0.67
2027	327,015	217	898	291	163	4	490	141	2,203	0.67
2028	351,197	234	964	311	171	4	527	151	2,362	0.67
2029	376,284	253	1,031	331	180	5	565	162	2,527	0.67
2034	523,558	363	1,407	442	227	6	795	228	3,468	0.66
2039	704,995	507	1,849	571	286	8	1,083	310	4,614	0.65
2044	913,943	678	2,305	709	353	10	1,423	406	5,883	0.64
2049	1,168,330	875	2,780	850	434	13	1,831	522	7,304	0.63
2059	1,877,965	1,337	3,828	1,086	639	19	2,931	834	10,673	0.57
2069	3,005,270	1,908	5,278	1,183	927	27	4,672	1,322	15,317	0.51

The cost of PD pensions and dependents benefits is the present value of pensions awarded during the year. For all other benefits, the cost is the payments made during the year.

1 Includes medical benefits, physical and vocational rehabilitation, constant attendance allowances, activities promoting safety and health, penalties written off and general expenditure not elsewhere classified.

1 Includes medical benefits, physical and vocational rehabilitation, constant attendance allowances, activities promoting safety and health, penalties written off and general expenditure not elsewhere classified.

Compared to the baseline scenario of the EI branch of ESSS, the cost will drop from 0.69 per cent of insured earnings (2020 being an exceptional year due to COVID-19 pandemic) to 0.51 per cent of insured earnings at the end of the projection period. Since the participants as at 31 December 2023 keep their entitlement as per Act 4, it takes a long period of time to see the impact of the changes proposed in the new Social Security Act. However, it does show that this impact will tend to be a reduction of cost of 0.15 per cent of insured earnings (approximately 30% less costly than the baseline scenario of the 11th Actuarial Review).



► Figure 1.2 Cost of benefits as percentage of insured wage – Comparison of base scenario with scenario of closure of Act 4

In the projections above, it is important to note the following:

- The impact of the revised schedule of injury is set to nil based on an analysis of a sample of claims conducted by SOCSO. The sample provided by SOCSO is related to the most frequent claims. It does not show a clear pattern on the impact of the benefits amounts paid (i.e., some injured will lose benefit entitlement, other will win).
- The contemplated change related to the maximum pension amount from all sources being at 100 per cent does not have a material impact on the projections. This assumption is based on data provided by SOCSO. The analysis shows that the impact is below the threshold of materiality to be considered in the modelling. While the proposal is a good governance practice (replacement ratio of social security schemes should not be above 100 percent), it will not have a material impact of the overall financial situation of the EI branch given the low level of cases involved. To support this, Table 1.8 shows the number of pensioners that reaches a level of pension compensation above 100 percent in respect of their first accident against the number of awards in the same year per scheme.

Age	EI Branc	:h	IS Branch			
	Awards at 100% and more	All awards	Awards at 100% and more	All awards		
2015	4	1,063	4	6,173		
2016	15	1,119	13	8,039		
2017	10	1,032	10	8,877		
2018	8	1,000	10	8,851		
2019	4	1,028	11	9,211		

Table 1.8 Number of awards that will reach a pension level above 100 percent

Changes are also proposed to the IS branch of ESSS as part of the closure of Act 4. SOCSO must always consider the global financial situation of both branches and the next chapter will present the demographic and financial impact of the proposed changes to ESSS. The impacts of the proposed changes are commented on in Chapter 3 of this technical note.

Table 1.10 presents the projections of the technical reserve calculated at the end of each year by using the projected number of pensioners, their average amount of pensions at the end of each year and the annuity factors defined by regulation. This is a prospective calculation. It would differ from the result reported in the financial statements, which is calculated retrospectively and depends on the actual benefits paid and investment returns realized by the fund. The prospective approach gives more adequate information on benefits liabilities.

The proposal to close Act 4 does not specify a methodology to calculate the actuarial factor to be used to establish the technical reserve. This report assumes that the methodology proposed in the 11th actuarial valuation of ESSS in section 3.8 applies. For illustration, actuarial present values have been calculated based on the mortality rates, nominal interest and inflation used for this valuation. As mortality is assumed to improve over time, the factors theoretically reflect the situation of pensions awarded in 2020 only. Thereafter, they should be slightly higher every year to take into consideration the improvement in mortality. Table 1.10 shows the actuarial factors in use in the current Act and the factors developed as part of the proposed closure of Act 4. The ratio of factors used in the new act to those in Act 4 decreases with age as pensions are no longer paid for life and the impact of this change increases with age.

Age	Current factors	Proposed factor for new Act			
		Revised factors	Ratio to current factor		
PDB factors					
17	8,973	8,743	0.97		
22	8,530	8,086	0.95		
27	8,029	7,346	0.91		
32	7,479	6,514	0.87		
37	6,876	5,598	0.81		
42	6,221	4,599	0.74		
47	5,538	3,503	0.63		
52	4,880	2,273	0.47		
57	4,238	837	0.20		
62	3,637	0	0.00		
Survivors' facto	rs				
17	9,756	8,761	0.90		
22	9,346	8,105	0.87		
27	8,893	7,367	0.83		
32	8,387	6,537	0.78		
37	7,817	5,626	0.72		
42	7,189	4,634	0.64		
47	6,509	3,550	0.55		
52	5,796	2,339	0.40		
57	5,056	932	0.18		
62	4,341	88	0.02		
67	3,671	0	0.00		

Table 1.9 Actuarial present value factors – Current factors and proposed factors for closure of Act 4

The contingency reserve is based on the projected benefit expenditure and the capitalized present value of benefits awarded.

In principle, it is not possible to project the free reserve before completing the analysis of the Invalidity Branch because the investment income allocated to the EI branch depends on the investment income of both branches. It is known from previous valuations that the contribution rate for the IS branch is not sufficient and that the proposed changes to the Social Security Act are not sufficient to make the IS branch financially sustainable. If no further action is taken to address IS branch financing, this would have an impact on the EI fund as the assets would be used to pay for both EI and IS benefits and would not be available to generate investment income to increase the EI reserves.

Year	Technical reserve	Contingency reserve	Ratio: Technical Reserve/ Long-term benefits
2019	6,246	575	14.1
2020	6,350	617	14.0
2021	6,721	708	15.4
2022	7,068	771	15.1
2023	7,449	808	14.8
2024	7,874	866	14.5
2025	8,333	932	14.2
2026	8,825	1,003	14.0
2027	9,360	1,078	13.9
2028	9,938	1,157	13.8
2029	10,561	1,239	13.8
2034	14,275	1,710	13.9
2039	19,107	2,299	14.1
2044	25,225	2,971	14.5
2049	32,538	3,778	14.8
2059	49,319	5,825	14.8
2069	62,898	8,390	12.6

Table 1.10 Projected required prospective technical reserve and contingency reserve (MYR million)

The ratio of the technical reserve to the annual long-term benefits expenditure decreases over the projection period as more participants are covered under the new Social Security Act. This reflects the structural change to the benefit provisions.

1.4 Impact of industry-rating in the contribution-setting of the El branch

In addition to the closure of Act 4, national stakeholders are also considering the implementation of industry-rating in the contribution-setting mechanism of the EI branch of ESSS. In order to proceed with this analysis, the ILO has requested SOCSO to provide the claims (per broad type) and salary per industry category for the years 2015 to 2019.

The following information provided by SOCSO covered years 2015 to 2019. For the determination of industry rates, the following data for each of the 17 industries has been used:

- Salaries;
- Temporary disablement: benefits paid;
- Permanent disability: present value of awards;
- Dependants' benefits: present value of awards;
- Funeral benefits: benefits paid;
- Constant attendance allowance: benefits paid.

A summary of data is presented in Table A3.33

An analysis was performed, using only the information related to local workers. The experience of foreign workers is too limited (only 1 year) to derive credible adjustments to the contribution rate setting mechanism. In the future, the industry-rating should be carried out on a holistic basis, where the origin of the workers is less important than the industry that they are working in.

The first step of the determination of the rates for each industry is the calculation of the risk relativity factors, which is the relation between the risk of the industry and the average risk of employers. It is determined by comparing the ratio of the compensation costs of each industry to its salaries to the corresponding ratio for all industries. The ratio of benefits to salaries for all industries can be found in the last column of Table 1.7. The risk relativity factors of each industry code are applied to the projected ratio of benefits to salaries for all industries to obtain the benefits component of the rate in each projection year. Table 1.11 shows the risk relativity factors.

The impact of the administrative expenditure on rates is determined in a second step. For this purpose, the administrative expenditures used for the EI branch are those projected in the context of the scenario of the transfer of the EI free reserve to the IS branch described in the valuation report. Over the projection period, the administrative expenditures are in the range of 16 percent to 20 percent of benefits costs. They are allocated by industry as follows:

> 80 percent is allocated according to benefits and 20 percent according to insurable earnings

The total rate for each industry code is obtained by multiplying its benefits component by a coefficient, for example 1.3075 in 2024 for Industry Code 1 (the relevant coefficient can be found in Table 1.11 of this note) .and adding to the result a flat percentage, for example 0.04 percent in 2024.

The total rate in this context refers to the contribution rate applicable for the industry, which includes the provision for the benefits payable but also the administrative expenses. Table 1.7 sets out the projected benefit cost only of the EI branch of ESSS (and does not include administrative costs). The flat percentage refers to the administrative expenses in respect of the EI branch. Other issues can be considered by national stakeholders during the implementation of industry-rating, such as having a minimum and maximum value.

Table 1.12 shows the applicable contribution rate on a full-funding basis under the industry-rating mechanism for selected years.

An arbitrary adjustment was made to industry codes 15 and 16, since their experience is significantly below and

above that of the other groups respectively. This may be due to the limited size of the group compared to other groups or mismatch in the recording of salaries and benefits by industry. In any case, the adjustment factor using raw data would have been below 0.1 and over 10.0 for group 15 and 16 respectively, which is extreme compared to the other groups. Their relativity factors are slightly different from one because the impact of the adjustment is not neutral. A balancing factor is applied to relativity risk factors determined from raw data to ensure that the sum of the product of risk relativity factor by salaries is equal to compensation costs of all industries. This balancing factor is 1.0128.

Industry **Risk relativity** Industry code factor 1.3075 1 Agriculture, forestry and fishing 2 1.3327 Mining and quarrying 3 1.0583 Manufacturing 4 0.5681 Electricity, gas, water, and sanitary services 5 1.7107 Construction 6 0.5467 Wholesale trade Retail trade 7 1.7532 8 0.6119 Accommodation and food services activities 9 2.4123 Transportation and storage 10 0.4433 Financial and insurance/takaful activities 0.6709 Real estate, leasing and business 11 12 1.0751 Public administration and defence / Compulsory social security 13 0.6274 Education 14 0.8823 Health and social work 15 1.0128 Other community, social and personal services activities

► Table 1.11 Risk relativity factors

16

17

1.0128

1.9650

The minimum and maximum risk relativity factor are 0.5467 and 2.4123 respectively. For the purpose of this report, it was considered relevant to keep the methodology simple and to avoid using insurance mechanisms such as limits to certain compensation costs and statistical credibility formula. The introduction of such mechanisms generally has the effect of reducing the range in which the rates lie.

Activities and extraterritorial organisations and bodies

Private household with employed person

In theory, Table 1.11 could be retained as-is if national stakeholders are comfortable with the proposed method for applying industry-rates. As such, the base contribution rate determined as per the 11th Actuarial Valuation could be multiplied by the above factors in order to derive the applicable contribution rate for each industry. However, as stated previously, the method shown in this section is simple and avoids other practices that

national stakeholders could consider important (ex: limitation of certain compensation used in the calculation, more stringent definition of exposure, etc.). Hence, national dialogue on the methodology should be initiated to ensure the capture of all important parameters for national stakeholders.

► Table 1.12 Projection of contribution rate as per full-funding principles for the EI branch of ESSS under industry-rating (in % of insured wages)

Industry			Year		
code	2024	2034	2044	2054	2064
1	1.03%	1.00%	0.96%	0.89%	0.82%
2	1.05%	1.02%	0.98%	0.91%	0.83%
3	0.84%	0.82%	0.78%	0.73%	0.67%
4	0.47%	0.46%	0.44%	0.41%	0.38%
5	1.34%	1.30%	1.24%	1.16%	1.06%
6	0.45%	0.44%	0.42%	0.40%	0.36%
7	1.37%	1.33%	1.27%	1.19%	1.08%
8	0.50%	0.49%	0.47%	0.44%	0.40%
9	1.87%	1.82%	1.74%	1.62%	1.47%
10	0.37%	0.37%	0.35%	0.33%	0.30%
11	0.55%	0.53%	0.51%	0.48%	0.44%
12	0.85%	0.83%	0.80%	0.74%	0.68%
13	0.51%	0.50%	0.48%	0.45%	0.41%
14	0.71%	0.69%	0.66%	0.62%	0.56%
15	0.81%	0.79%	0.75%	0.70%	0.64%
16	0.81%	0.79%	0.75%	0.70%	0.64%
17	1.53%	1.49%	1.42%	1.33%	1.21%
% of active members covered under the new Act	4%	33%	57%	79%	94%

The contribution rates evolve in line with the evolution of the proportion of insured covered by the new act towards its ultimate level.

The contribution rates by industry presented in this report are based on data which we understand include certain anomalies. For this analysis, certain corrections to data based on the judgement of the actuaries have been made. SOCSO must consider that rates are preliminary estimates. They provide a valuable indication of differences in rates by industry which may be useful to pursue further the analysis on the relevance of introducing such a pricing mechanism for the EI branch. It should be understood that the method used to provide the

illustrations is simple and should be refined and that the database should be validated thoroughly if SOCSO intends to implement industry rating in the EI branch.

Other considerations related to application of industry-rating

The industry codes were provided directly by SOCSO and were not developed specifically with a view of being used for industry-rating. While the current industry code can be used as a first step for implementing industry-rating for the EI branch of ESSS, national stakeholders will also need to work on a proper classification structure in the future.

Under differential rating systems specific assessment rates are calculated for each group of employers that exhibit similar risk characteristics. Employers are therefore classified in groups following a classification structure. The design of a classification structure is generally the result of an interdisciplinary process. While the actuary has an important role to play in assessing the efficiency of the rating system, the classification structure will require the input of experts with an in-depth knowledge of the different industries in Malaysia. Therefore, the analysis and decision making requires the work of economists, engineers, specialists in industrial relations and many others. As with all significant changes to workplace injury insurance system, employers and workers also need to be involved in the process, either as active participants or at the least in the form of commenting and inputting into the process and the results of the working group.

It is generally recognized that a classification structure must meet the following criteria:

- Homogeneity: risks within a group should exhibit similar characteristics;
- Credibility: experience must be large enough to be statistically credible;
- Neutrality: definitions of each class should be precise enough to avoid the possibility that two similar risks be classified differently by different people; and
- Cost efficient: the system should not create an undue burden on employers and to the institution administering it.

Industry classification systems used for the reporting of economic statistics on national economies may not be fully appropriate for the purpose of an employment injury system. Those systems are based on economic activities and may group together operations that have different risk characteristics, even though they belong to the same economic sector. Industry classification systems are generally used as a starting point, but they may have to be adjusted to respond to the needs of the rating system. A classification structure should be dynamic and must be periodically adapted to the changing environment. New risks and safer methods of operations must be recognized properly to ensure equity and acceptance of the system by employers. A permanent updating process must be put in place.

The question as to how many groups should make up the classification structure is a complex one. The objective of the rating system is to calculate a specific assessment rate for each group of employers that exhibit similar risk characteristics. Fairness suggests that one should define as many groups as necessary to charge the appropriate cost to each employer. In practice, however, the number of groups should be limited because the injury experience of many groups would not be statistically credible, and the administration of the system would be difficult. The workload related to classifying and the risk of making a mistake in classification increases with the number of rate pools.

There is no actuarial formula to determine the optimal number of groups in a particular environment. Undue complexity is costly and not necessarily a guarantee of success while over-simplicity is not desirable because this may generate a significant degree of inequity. Refined classification systems may comprise a few hundred rate units. This is usually not possible nor even necessary in all jurisdictions. The diversity of operations requires defining several units for each of the main economic sectors, for which the actuary must ensure that the collection of data can support the actuarial analysis for the calculation of rate groups.

The box below shows the example of classification criteria set out in the province of British Columbia (Canada).

Classification criteria – Example of British Columbia, Canada

The B.C. Board, along with other jurisdictions in Canada, has chosen to create self-sufficient groups of employers on the basis of the industries in which they operate. In establishing these groups, the size is of critical importance. Since one serious injury can cost in excess of \$1 million, it is apparent that the size of the group must be large enough to provide for an adequate spread of the risk and stability in the assessment rate.

The classification system of WorkSafeBC has the following structure (in hierarchy order): Classification Unit; Industry Group; Subsector, Sector and Aggregate, with Rate Groups made up of Industry Groups from different Subsectors if they share similar cost rates.

Classification Unit

Employers are classified into approximately 600 Classification Units with other employers who produce similar products or provide comparable services. Other criteria used to establish a Classification Unit include similarity of processes, inputs, and equipment. Each Classification Unit is made up of a relatively homogenous group of employers who are considered by the Board to be peers and competitors in business.

Industry Group

The purpose of the classification category 'Industry Group' is to combine Classification Units into larger groups that are big enough to allow statistics about their claims history to be calculated. The minimum size for an Industry Group is a collection of Classification Units with at least:

- 1. 200 short term disability claims over the last five years, with a minimum of 25 claims in each of the last two years; or
- 2. \$40 million of annual assessable payroll in each of the last three years.

Minimum size criteria ensure that Industry Groups are large enough to be regarded as having some predictability for future claims experience. These figures may periodically be reviewed and modified by the Board's actuary to ensure that a balance between stable rates and flexible classifications is maintained. To meet the minimum size criteria, Classification Units that produce similar products or services and show reasonably similar cost rates, are classified into an Industry Group. An example of an Industry Group might be "Fruit Farms," made up of the Classification Units "Berry Farms," "Orchards," and "Vineyards."

Subsector

Classification Units that are combined into an Industry Group all come from the same Subsector. The purpose of Subsectors is to provide boundaries within which Classification Units are classified into Industry Groups. This boundary ensures that employers can recognize that they are classified fairly, since they share similarities with other employers in their Industry Group. An example of a Subsector is Agriculture. The Agriculture Subsector may include the Industry Groups "Fruit Farms", "Vegetable Farms", and "Animal Farms".

Rate Group

The purpose of the Rate Group category is to combine Industry Groups into large enough insurance pools that their risk can be measured and therefore their future costs can be predicted. The Board can calculate the appropriate assessment rate to be charged to each Rate Group. Minimum size for a Rate Group allows rates to be set using only recent claims data.

Employers have more incentive to improve their current workplace safety record. Rate Group is a collection of one or more Industry Groups who have similar cost rates and whose size meets or exceeds:

- 1. 2000 short term disability claims over the last five years, with a minimum of 250 claims in each of the last two years; or
- 2. \$400 million of annual assessable payroll in each of the last three years.

These minimum size criteria are based on actuarial principles and ensure that Rate Groups are large enough to be viable for statistical and insurance purposes. These figures may periodically be reviewed and modified by the Board's actuary to ensure that the balance of stable rates and flexible classifications is maintained. To meet the minimum size criteria, Industry Groups generally from the same Sector that have similar cost rates over the last three years, are combined to form a Rate Group.

Sectors

Sectors are large categories of employers that are involved in the same area of the economy at the broadest level. There are 7 principal Sectors:

- 1. Primary Resource the extraction of natural resources and agriculture;
- 2. Manufacturing the production of goods;
- 3. Construction the building of structures, roads, etc.;
- 4. Transportation and Warehousing air, land, marine transport, and storage;
- 5. Trade wholesale and retail;
- 6. Public Services publicly funded services; and
- 7. General Services privately funded services.

The purpose of Sectors is to provide boundaries within which Industry Groups are classified into Rate Groups. There are exceptions to this practice when an Industry Group's cost rates differ substantially from those of all the other Industry Groups in its Sector. In this case, Industry Groups are classified into Rate Groups with Industry Groups from a different Sector. The category "Sector" also permits broad structural data to be derived in determining and communicating injury trends.

Aggregate

The largest classification category is the Aggregate, made up of all the employers in the province. The Aggregate category is used to pool and distribute certain costs that are difficult to allocate to individual Rate Groups. For example, the Board's administrative costs are distributed from this level down to Rate Groups.

Source : Employer Classification Structure Discussion Paper – WorkSafe BC



Valuation of invalidity and survivors' benefits of ESSS in the context of closure of Act 4

2.1 Introduction

It is assumed that the closure of Act 4 will take place on 31 December 2023 and that a new Social Security Act will be enacted on 1 January 2024. This assumption is the same as the one used for the EI branch.

The projections give an indication of the financial impact of the proposed changes and the years when increases in the contribution rate will probably be required. This approach is consistent with the partially funded scaled premium (SP) financial system which is applied to these benefits.

2.2 The financial system for invalidity and survivors' benefits

These benefits are long-term benefits, awarded mainly in the form of pensions which continue in payment throughout the lifetime of the beneficiary or up to a certain age under the new act (i.e., an invalidity or survivor pensioner) or during a specified status (e.g., an orphan being under the age of 21). Total annual benefit expenditure as a percentage of the insured salary bill is expected to increase continuously over a long period of time until the scheme reaches maturity. Any significant changes in the scheme, such as expansion of coverage or changes in the benefit formula will extend the scheme maturing process.

In view of the above, there is a variety of possible financial systems for a social security pension scheme, from pay-as-you-go (PAYG) at one extreme to the general average premium system (GAP) at the other. PAYG cost rates continuously increases with practically no reserves. The GAP contribution rate is a flat contribution rate over the projection period with an accumulation of substantial reserves in certain circumstances, for example in the maturing stage of an old-age pension scheme.

In practice, many employment injury insurance schemes use the terminal funding system (TFS) or the assessment of constituent capitals system which is being applied to PDB and dependents' benefits under the employment injury benefits branch. The TFS is a funding system so that the future full cost of new benefits during the year, i.e., the capitalized present value of new benefits, should be covered by the contributions of that year. In consequence, the accumulated reserve fund together with future investment earnings should fully cover the future cost of pensions already in payment. The TFS system for long-term employment injury benefits is adopted in several countries since it is considered appropriate to make full provision for compensation of industrial injuries or occupational diseases at the time of occurrence. The rate of pension is a fixed percentage of the wage regardless of the contributory period of the individual.

In contrast, SOCSO invalidity and survivors' benefits pension formula for ESSS is proportional to the contributory period within maximum and minimum limits on the replacement rate. In most countries, invalidity and survivors' pensions form a part of a composite scheme including old-age pensions. The general financing practice is to adopt a partially funded system with flat contribution rates over successive intervals to meet a target reserve condition. This financial system is called the scaled premium system (SP).

A variant reserve condition of this system is that the reserve should increase over each interval, reaching a plateau at the end of the interval. The reserve fund would start to decrease if the same contribution rate continued beyond the interval. This variant is applied in several emerging economies. Although the scheme intends to use the investment return on funds for benefit payments, it does not use the reserve itself to meet expenditure. This enables the reserves to be invested in long-term assets. The previous actuarial valuations of the invalidity and survivors' benefits branch have been performed on the basis of the SP system. It is also adopted for the projections in this chapter.

2.3 Demographic and financial projections

Demographic and financial projections were carried out according to the methodology and assumptions described in Appendix 2 and Appendix 3. They are presented in Table 2.1, 2.2 and 2.3 for participants to Act 4 only, the new Act and all Acts respectively.

Table 2.1 Demographic projections of invalidity and survivors' benefits branch – Act 4 only

Year	Numbers					% per active insured			
	Active	Invalid	Depen	dents	Funeral	Invalid	Dependents		Funeral
	insured		Widow (ers)	Orphans and parents	grants		Widow (ers)	Orphans and parents	grants
2020	6,853,961	75,290	143,335	166,134	17,077	1.10	2.09	2.42	0.25
2021	6,995,152	80,217	153,838	189,184	17,063	1.15	2.20	2.70	0.24
2022	7,102,713	85,171	164,426	200,178	17,235	1.20	2.31	2.82	0.24
2023	7,202,569	90,154	175,050	209,944	17,420	1.25	2.43	2.91	0.24
2024	7,020,518	95,146	185,669	227,802	17,603	1.36	2.64	3.24	0.25
2025	6,841,963	100,200	196,318	244,748	17,605	1.46	2.87	3.58	0.26
2026	6,667,107	105,355	207,022	260,135	17,623	1.58	3.11	3.90	0.26
2027	6,499,913	110,586	217,743	273,390	17,652	1.70	3.35	4.21	0.27
2028	6,334,387	115,864	228,427	283,977	17,698	1.83	3.61	4.48	0.28
2029	6,171,255	121,190	239,055	292,477	17,754	1.96	3.87	4.74	0.29
2034	5,400,117	148,839	291,110	313,682	18,321	2.76	5.39	5.81	0.34
2039	4,589,305	179,077	340,834	298,635	19,000	3.90	7.43	6.51	0.41
2044	3,580,237	209,537	385,272	253,880	18,696	5.85	10.76	7.09	0.52
2049	2,505,862	234,389	417,691	211,766	16,994	9.35	16.67	8.45	0.68
2059	662,023	243,462	420,864	73,202	10,306	36.78	63.57	11.06	1.56
2069	0	185,551	341,252	8,299	6,236	N/A	N/A	N/A	N/A

1 Active insured: number of insured contributing at least once during the year

Year	Numbers					% per active insured			
	Active	Active Invalid	Depen	dents	Funeral Invalid		Dependents		Funeral
	insured		Widow (ers)	Orphans and parents	grants		Widow (ers)	Orphans and parents	grants
2020	0	0	0	0	0	N/A	N/A	N/A	N/A
2021	0	0	0	0	0	N/A	N/A	N/A	N/A
2022	0	0	0	0	0	N/A	N/A	N/A	N/A
2023	0	0	0	0	0	N/A	N/A	N/A	N/A
2024	274,508	0	0	0	0	0.00	0.00	0.00	0.00
2025	538,404	0	0	0	182	0.00	0.00	0.00	0.03
2026	792,327	0	0	0	354	0.00	0.00	0.00	0.04
2027	1,033,496	16	18	92	521	0.00	0.00	0.01	0.05
2028	1,269,086	64	76	401	678	0.01	0.01	0.03	0.05
2029	1,499,675	149	185	977	831	0.01	0.01	0.07	0.06
2034	2,591,474	1,145	1,657	8,026	1,543	0.04	0.06	0.31	0.06
2039	3,605,292	3,248	5,037	20,469	2,282	0.09	0.14	0.57	0.06
2044	4,595,517	6,932	10,488	37,015	3,219	0.15	0.23	0.81	0.07
2049	5,565,701	14,134	19,271	64,857	4,787	0.25	0.35	1.17	0.09
2059	7,022,267	52,189	62,652	151,404	9,314	0.74	0.89	2.16	0.13
2069	7,438,306	89,829	93,573	175,068	11,851	1.21	1.26	2.35	0.16

Table 2.2 Demographic projections of invalidity and survivors' benefits branch – New Act only

1 Active insured: number of insured contributing at least once during the year

Year				%	per activ	ve insured			
	Active	Invalid	Depen	dents	Funeral	Invalid	Depe	ndents	Funeral
	insured		Widow (ers)	Orphans and parents	grants		Widow (ers)	Orphans and parents	grants
2020	6,853,961	75,290	143,335	166,134	17,077	1.10	2.09	2.42	0.25
2021	6,995,152	80,217	153,838	189,184	17,063	1.15	2.20	2.70	0.24
2022	7,102,713	85,171	164,426	200,178	17,235	1.20	2.31	2.82	0.24
2023	7,202,569	90,154	175,050	209,944	17,420	1.25	2.43	2.91	0.24
2024	7,295,025	95,146	185,669	227,802	17,603	1.30	2.55	3.12	0.24
2025	7,380,367	100,200	196,318	244,748	17,787	1.36	2.66	3.32	0.24
2026	7,459,435	105,355	207,022	260,135	17,977	1.41	2.78	3.49	0.24
2027	7,533,409	110,602	217,761	273,482	18,173	1.47	2.89	3.63	0.24
2028	7,603,473	115,928	228,504	284,378	18,376	1.52	3.01	3.74	0.24
2029	7,670,930	121,339	239,240	293,454	18,585	1.58	3.12	3.83	0.24
2034	7,991,590	149,985	292,767	321,708	19,863	1.88	3.66	4.03	0.25
2039	8,194,598	182,326	345,871	319,104	21,282	2.22	4.22	3.89	0.26
2044	8,175,754	216,469	395,761	290,895	21,916	2.65	4.84	3.56	0.27
2049	8,071,563	248,523	436,962	276,624	21,781	3.08	5.41	3.43	0.27
2059	7,684,289	295,650	483,516	224,606	19,621	3.85	6.29	2.92	0.26
2069	7,438,306	275,380	434,826	183,367	18,087	3.70	5.85	2.47	0.24

Table 2.3 Demographic projections of invalidity and survivors' benefits branch – All Acts

1 Active insured: number of insured contributing at least once during the year



Figure 2.1 Ratio of pensioners to active members – Comparison of base scenario with scenario of closure of Act 4

The impact of the proposed change is projected to be more gradual than the same change on the EI branch. Lump-sum payments are not the norm in the IS branch (commutation is not possible) and the impact of the integration with the Provident Fund takes a longer time to shown in the financial results of the scheme. The number of pensioners in the IS branch under the proposed changes becomes lower than in the baseline scenario of the 11th Actuarial Review after several decades. For example, the difference for the invalid is 0.2 percent in 2049 while it reaches 14 percent in 2069.

Table 2.4 presents the financial projections with the proposed changes considered.
Year	Insured	Invalidity	Dep	endents	Funeral	Dialysis	Other ¹	Total	Total as %
	salary bill	pensions	Widow (ers)	Orphans and parents	grants				of insured salary bill
2020	166,845	948	977	605	34	303	103	2,970	1.78
2021	180,675	1,053	1,096	705	36	325	116	3,332	1.84
2022	195,474	1,156	1,215	752	39	354	129	3,645	1.86
2023	212,949	1,265	1,341	800	42	388	143	3,978	1.87
2024	231,531	1,386	1,476	892	45	425	157	4,381	1.89
2025	251,366	1,520	1,623	988	49	466	172	4,817	1.92
2026	271,400	1,671	1,783	1,087	53	508	188	5,290	1.95
2027	292,354	1,839	1,958	1,187	57	554	204	5,801	1.98
2028	314,185	2,027	2,149	1,289	61	604	222	6,352	2.02
2029	336,860	2,234	2,357	1,394	65	658	242	6,950	2.06
2034	470,312	3,604	3,672	1,989	93	1,002	355	10,714	2.28
2039	634,452	5,734	5,555	2,633	131	1,487	503	16,043	2.53
2044	818,307	8,839	8,137	3,278	174	2,046	689	23,164	2.83
2049	1,039,803	13,047	11,451	4,093	224	2,692	907	32,414	3.12
2059	1,653,214	25,005	20,283	5,589	336	4,070	1,415	56,699	3.43
2069	2,666,412	36,347	28,446	7,598	515	6,573	1,874	81,351	3.05

Table 2.4 Financial projections of invalidity and survivors' benefits branch – All Acts

1 Includes grants for invalidity and deaths, physical and vocational rehabilitation, constant attendance allowances, activities promoting safety and health, FCLB (penalties written off) and general expenditure not elsewhere classified

As with the demographic projections, it takes a lot of time to see the impact of the proposed changes in the financial projections of the IS branch of ESSS. The ultimate cost of the scheme expressed as a percentage of the insured bill goes from 3.48 per cent in the baseline scenario of the 11th Actuarial Review to 3.05 per cent in the projections taking into account the proposed change. While this is a reduction of cost of almost 15 per cent, this is far from sufficient if the goal of national stakeholders is to lower the cost of the scheme to the current contribution rate of the IS branch (i.e., 1.0%).

The GAP over the 50-year projection period for this scenario of the closure of Act 4 is 2.73 per cent of insured earnings, which is almost the same as the GAP under the base scenario of the 11th Actuarial Review (2.76 per cent).

In all the above analysis, administrative expenditure should be added to establish the required contribution rate. The conclusions and the need to change structurally the IS branch, either through benefit and/or contribution rate increase, remains as urgent as presented in the 11th Actuarial Valuation report.

Table 2.5 illustrates the evolution of the Invalidity Fund if the contribution rate is not increased. For this illustration, the current methods of allocation of investment income and administrative expenditure are used.

Year		Income		Ex	penditure			
	Contribution	Investment	Total	Benefits	Admini strative	Total	Total Asset	Assets/ Expenditure
2019							6,185	
2020	1,668	536	2,204	2,970	276	3,246	5,143	1.6
2021	1,807	545	2,352	3,332	307	3,639	3,855	1.1
2022	1,955	551	2,506	3,645	340	3,985	2,377	0.6
2023	2,129	556	2,686	3,978	376	4,354	709	0.2
2024	2,315	558	2,874	4,381	418	4,800	-1,217	-0.3
2025	2,514	555	3,069	4,817	465	5,282	-3,431	-0.6
2026	2,714	547	3,261	5,289	516	5,805	-5,975	-1.0
2027	2,924	532	3,455	5,800	572	6,372	-8,892	-1.4
2028	3,142	509	3,651	6,352	633	6,985	-12,225	-1.8
2029	3,369	477	3,846	6,949	671	7,620	-16,000	-2.1
2034	4,703	123	4,826	10,714	893	11,607	-43,349	-3.7
2039	6,345	-663	5,682	16,042	1,173	17,215	-90,593	-5.3
2044	8,183	-2,177	6,007	23,163	1,519	24,682	-168,458	-6.8
2049	10,398	-4,840	5,558	32,412	1,964	34,377	-291,018	-8.5
2059	16,532	-15,762	770	56,698	3,274	59,972	-734,171	-12.2
2069	26,664	-38,435	-11,771	81,350	5,437	86,787	-1,545,476	-17.8

Table 2.5 Illustration of projected revenue, expenditure, and assets – All Acts (MYR million)

Since the fund is expected to be depleted in 2024 under the base scenario of the 11th Actuarial Review, the changes brought to the scheme do not have an impact on that important date. While the proposed changes are a good step towards bringing financial sustainability to the IS branch, it only changes marginally the accumulated deficit of the fund at the end of the projection period.

When both branches are considered as a whole, the total SOCSO fund for ESSS will be depleted in 2035 under this proposal, which is the same year as under the base scenario of the 11th Actuarial Valuation Review. As stated in the valuation report, national stakeholders are urgently required to agree on changes to the IS scheme, and changes like the one assessed in this report will not be sufficient to return to a financially sustainable situation for ESSS in subsequent decades.

Figure 2.2 presents the evolution of the total fund in the context of the proposed closure of Act 4. As with the base scenario of the 11th Actuarial Review, the trends of EI and IS funds substantially diverge over the projection period.



Figure 2.2 Illustration of the evolution of funds- status quo (MYR million)

Financial sustainability requires immediate action. The matter is discussed in Section 3.

3

Observations related to the proposed closure of Act 4 and enacting a new Social Security Act (ESSS)

Chapter 2 and 3 set out the financial projections related to the proposal of closing the current in-force Act 4 and to create a new Social Security Act. The understanding of the ILO is that the aim of this proposal is to ensure integration with the Provident Fund, fairness in the benefit package and to return to financial sustainability for the IS branch. This section will analyse the proposal in light of the objectives mentioned above.

Integration with the Provident Fund

The most important change proposed in the reform is to integrate the benefits payable from ESSS with the Provident Fund mainly by ceasing to pay pensions to disabled at the time of their theoretical retirement age to avoid overcompensation³. This overcompensation is especially possible for people who become disabled at advanced ages when they have contributed to an old-age pension scheme for a good part of their career. The intentions of the contemplated changes are in line with sound international practices where a harmonious transition and integration between invalidity and old-age pension is generally provided for.

While it is good practice in theory, we believe that it is not appropriate in the current context in Malaysia. Integration of various branches of social security is key to ensure fair and adequate benefit provision and services to workers in case of many contingencies, such as old-age, disability, work-place accident and death. However,

³ The same reasoning applies to survivors of deceased pensioners and insured, mutatis mutandis.

this integration assumes that the benefits delivered are of the same nature. Pensions will be integrated with other pensions payable from other branches of the social security scheme.

The proposal of national stakeholders to integrate the Provident Fund with the benefit package of ESSS does not meet the requirement of integrating benefits of the same type. The Provident Fund provides a lump-sum at retirement. The amount is based on the contributions made to the fund, and the interest credited on these amounts. Hence, this scheme is considered a defined-contribution (DC) pension plan. However, the benefit provided by ESSS is a defined-benefit (DB) scheme, where the amount of benefit is known in advance (i.e. pension based on percentage of wage at the time of the accident and the degree of disability) and the contribution required to fund the system is not known in advance.

The current situation of the different social security branches reflects a very difficult financial situation of ESSS. Some may argue that workers use the IS branch as a retirement scheme, where the invalidity pension may be considered as a retirement income since it lasts until death. If this is the case, it should then be interpreted by national stakeholders that old-age protection under the Provident Fund is inadequate and that a real workable solution should be put in place in Malaysia.

While the integration with other branches of social security is a good governance practice, it is not recommended to implement this proposed change until there is an old-age branch of the social security in place in Malaysia that meets the requirement of Convention No. 102, namely, to have in place a DB old-age social security scheme. A proposal on this is made in another technical note and will be discussed in detail.

Fairness in the benefit package

Some changes proposed by national stakeholders as part of the proposed closure of Act 4 and the enactment of a new Act with regards to the benefit package may seem minimal. For example, the limitation of pensions payable from all branches of the scheme to 100 per cent of the average wage of the worker does not have a real financial impact on the finances of the scheme. However, these changes are essential to ensure the fairness of the benefit package of ESSS.

All social security and insurance systems should aim at preventing overcompensation to beneficiaries. Overcompensation may lead to a situation where participants might try to "game" the system, to take advantage of the generous package offered for some contingencies. These limitations should maintain the benefit package at a level that is sufficient to keep a decent level of living for the beneficiaries. Nothing in the proposal seems to lower the benefit package to a level that is insufficient for the beneficiaries.

National stakeholders are considering changing the schedule of injuries. Based on mathematical analysis of frequent type of injuries, it is unclear to the ILO what will be the impact on the benefit package. These changes must be driven by a change or improvement in medical practice. In the past, some medical conditions could have significantly lowered the earning capacity of injured workers. The ESSS should have a proportional benefit package to cope with this situation. As medical science finds new way to return injured worker to the state prior to the accident, these changes in the earning capacity should also be reflected in the compensation package offered by ESSS.

A medical review of the revised schedule is not covered by the current terms of reference between the ILO and SOCSO. However, the ILO remains available to support SOCSO with regards to medical expertise required and related to the administration of ESSS.

Financial sustainability of ESSS following the change

Both the 10th and 11th actuarial valuations of ESSS, performed by the ILO, highlighted that the financial situation of the IS branch of ESSS was inadequate. Most of the changes adopted by national stakeholders to alleviate this situation were based on an increase of total contributors to the scheme, while not increasing the contribution rate. The 11th Actuarial Review of ESSS emphasises and recommends that an urgent increase in contribution rate is now needed

On paper, the changes proposed related to the closure of Act 4 seem significant and may give the impression to national stakeholders that they are part of the solution to the financial sustainability issues of ESSS. While the proposed changes are sound from a governance perspective, they are not adequate to address the financial sustainability of ESSS⁴. These proposed changes do not take away the urgent need for national dialogue on the financial sustainability of the ESSS; constituents must act now and increase the contribution rate of the IS branch with or without the closure of Act 4. If no immediate action is taken to increase the contribution rate, the IS branch will soon run out of funds.

The impact of the closure of Act 4 takes a long time to have a positive effect on the financial situation of ESSS. This is due to the fact that the most important change in the benefit structure, namely the end of payment of pension at retirement age, will take several decades to have an effect. For example, in the case of an insured person aged 20 that enters the scheme in 2024, if the worker suffers a work accident at age 40 for which an incapacity pension must be paid, it is only when the worker reaches age 60 that the payment structure of the new Act will be different to what was applicable before. The calendar year will be 2064 once this important financial change will take effect, which is late in the projection period of the 11th Actuarial Valuation of ESSS.

Other considerations related to the closure of Act 4

Closure of Acts are a strong signal sent to the population that significant changes are coming. It sends the signal that the Government is making significant changes to set up new and, perceived, improved legislation related to a specific issue. The proposed changes to Act 4 could be simply adopted through an amendment to the current Act 4 instead of closing completely the Act. While the changes are welcomed from a governance perspective, they will not fundamentally change the coverage and benefit package of injured and disabled workers. They are mainly standard changes and updates to an Act that reflect the current situation in Malaysia. Typically, national stakeholders use the closing of an Act when fundamental structural (and not parametric) changes are made, such as the implementation of a new branch like old-age pension for example. Also, the closing of the Act could be seen, unrealistically, as an end to the financial problems of the social security system by various stakeholders. However, as seen in Chapter 2 and 3, this is not the case.

Another important aspect that SOCSO and national stakeholders need to consider is related to the administration of the proposed change. The proposition states that the two schemes will be living side by side for as long as the last active member of Act 4 is not working anymore. However, as presented at the beginning of Chapter 2 of this technical note, the benefit package will vary significantly between the two parallel schemes. Administration of the benefits will be more difficult to handle by SOCSO, for example in ensuring that the relevant rules are applied correctly for the right participant. Also, the administrative system will have to support the dual schemes, and their specific administrative requirements. For example, payment of pensions will have to stop at a fixed age for all participants of the new Act, whereas the participants of Act 4 will have a lifetime pension payable. These changes, even if they look simple, will take significant work from SOCSO staff to implement and maintain. One method that could be retained to lower the administrative burden is to change all participating members to the new scheme. However, this may have the impact of lowering the buy-in of national stakeholders, especially current participants to Act 4, as they will lose value in the new benefit package offered by the ESSS.

⁴ It should be mentioned that if the new act applied to all insureds and not only to workers whose participation begins after entry into force of the law, the financial impact would be different. However, such a sudden transition is advisable only if appropriate measures are taken to preserve equity between generations.

One last aspect that SOCSO asked the ILO to comment on related to the closure of Act 4 was the impact of leaving the possibility to current participants of Act 4 to move to the new Act. Unless the contribution rate of the new Act is significantly lower than the current Act, the ILO foresees no transfer of workers from the old Act to the new one. The benefit package of the new Act is less generous than the old Act, and if the contribution rate is the same, there is no incentive for workers to switch their coverage. In addition, part of the periodic pension would not be available before retirement age as 15 percent would be transferred to the EPF, and beneficiaries may not place a high value on this provision. As seen in Chapter 1 and 2 of this technical note, there is no room to lower the contribution rate. In fact, even with the proposed change, the need to increase the contribution rate is ever more present for ESSS. The only way that would provide incentive for workers to transfer from the old Act to the new Act is to structure the closure of Act 4 as follows:

- Contribution rate is increased for grand-fathered participants in Act 4.
 - The justification underlying this increase is the fact that the benefit package is more generous under this Act than the new Act.
- The contribution rate of participants to the new Act is also increased but remains lower than that of participants in Act 4.
- The justification for the relative lower contribution rate is the fact that the benefit package is less generous in the new Act.



Description of the Employees' Social Security Scheme (as proposed after the closure of Act 4)

This appendix provides a general overview of the key coverage, contribution, benefit, and administration provisions of a new act applicable to new entrants after the closure of Act 4. One the main changes compared to the current scheme is to abolish lifetime pensions paid to disabled and to survivors of deceased and replace them with pensions paid to age 60 (or the moment the deceased would have reached that age). In addition, the pension paid by SOCSO would be reduced by an amount corresponding to the contributions paid by employees to the Employees' Provident Fund (EPF). This amount would be transmitted by SOCSO to the EPF.

For participants in the ESSS before the closure of Act 4, users of this technical note should refer to Appendix 1 of the *Report to the Government Social Security Organization: the eleventh actuarial valuation of the Employees' Social Security Act as at 31 December 2019* for benefits provision applicable to these insured members.

Legislation

A new act providing employment injury and invalidity benefits. Coverage for invalidity benefits ceases on attainment of age 60.

Administering Organisation

The Social Security Organisation was established as a government department on 1 January 1971 to enforce the Employees' Social Security Act. It is a statutory body headed by a director-general appointed by the Minister of Human Resources. The general direction and superintendence of the organisation vests in a tripartite Board. SOCSO administers a Social Security Fund for the payment of the benefits. The Organisation shall maintain proper accounts and prepare yearly statements of accounts to be audited by the Auditor General An annual report shall be submitted to the Minister and, at intervals of five years, the Board shall initiate an actuarial review on the working of the schemes involving a valuation of the assets and liabilities of the Organisation.

Categories of employees covered

All Malaysian citizens, permanent residents and migrant workers are covered regardless of their level of earnings. For determining contributions and benefits, the earnings are limited to a maximum of RM4,000 per month. Public sector employees are excluded from coverage, except temporary and contract employees who are liable under the Act effective from 1 June 2013. Domestic servants are excluded while self-employed are covered under Law 789.

Contribution provisions

Insured persons are classified into one of the wage classes for each of which an assumed wage is specified in ringgit. Since 1 June 2016 there are 45 wage classes with the 45th class including those earning more than RM4,000. Contributions for employment injury are entirely at the charge of the employer. Contributions for invalidity (and survivors') benefits are shared equally between the employer and the employee.

Employment injury benefits

"Employment injury" covers both industrial injuries and occupational diseases and includes commuting accidents. The qualifying condition for benefit is that of being in insurable employment at the relevant time.

"Medical benefit", provided to victims of employment injury, includes: medical consultations and home visits, outpatient treatment, pharmaceutical supplies, inpatient treatment and prosthetic appliances. Medical benefits are provided through a system of panel doctors appointed by SOCSO and in government hospitals.

"Temporary disablement benefit" is paid in the event of certified incapacity for work arising out of an employment injury, subject to a waiting period of three days. The daily rate of benefit is 80 percent of the reference wage i.e., one-thirtieth of the average assumed monthly wage over the preceding six months - subject to a minimum of MYR30 per day and to a maximum of MYR105.33 per day. The benefit is payable for seven days a week until the temporary disablement ends. The daily rate is reduced by 10 percent for each subsequent accident incurred during the period of one year until reaching the minimum daily rate of 50 percent.

"Permanent disablement benefit" is payable if permanent disablement, partial or total, results from an employment injury. The daily rate of total disablement benefit is 90 percent of the reference wage, subject to a minimum of MYR30 per day. The benefit rate for partial disablement is proportional to the degree of disablement. The pension paid to the beneficiary is reduced by a percentage corresponding to employees' contribution rate to the Provident Fund (15 percent). The contribution to the Provident Fund is transmitted by SOCSO. Benefits cease upon reaching age 60.

"Dependants' benefit" is payable in the event of death arising out of an employment injury, to a widow or widower and orphans. The widow(er) receives three-fifths and the orphans two-fifths (raised to three-fifths in the absence of a widow(er)) of 90 percent of the average assumed daily wage of the deceased. If there are no primary dependants, parents, grandparents (in the absence of parents) and siblings may claim the benefit (40 percent for parents and grandparents, 30 percent for siblings), subject to whole or partial dependence.

Widow(er), parent, or grandparent will receive monthly payments from the death of the Insured Person to when the Insured Person reaches retirement age e.g., 60 years old, had the insured been alive, or to when the widow(er), parent, or grandparent dies, whichever is earlier. Child or sibling will receive monthly payments from the death of the Insured Person to when the Insured Person reaches retirement age e.g., 60 years old, had the insured been alive, or to when the insured Person reaches retirement age e.g., 60 years old, had the insured been alive, or to when the child or sibling reaches the age of 25, or to when the child or sibling marries or starts working, whichever is earlier;

"Funeral benefit" (MYR2,000) on death as result of an employment injury or while receiving disablement benefit.

"Education benefit" may be provided to a dependent child of an insured employee who dies as a result of an employment injury or is in receipt of employment injury or invalidity benefits. Such benefit is provided on the terms and conditions that SOCSO deems fit to impose.

"Constant allowance" of MYR500 per month is payable to an insured employee who is entitled to disablement benefits and who is so severely incapacitated that he requires personal attendance and care of another person.

"Rehabilitation benefit", consisting of vocational and physical rehabilitation, is available to employees suffering permanent disablement

Invalidity (and survivors') benefits

"Invalidity pension" is payable, subject to qualifying contribution conditions, in the event of a disease of a permanent nature that is incurable or unlikely to be cured, occurring before age 60 and as a result of which an employee's earning capacity is reduced by at least two-thirds.

Subject to a credit of at least 24 contribution months over the preceding 40 months, or contributions for at least two-thirds of the period since entry subject to a minimum of 24 months, a "full pension" is payable: 50 percent of the reference wage, augmented by 1 percent for every 12 contribution months in excess of 24, subject to a maximum of 65 percent. The reference wage is the average assumed wage over the last 24 contribution months.

If the above conditions are not satisfied, but subject to a credit of contributions for at least one-third of the period since entry and a minimum of 24 months, a "reduced pension" is payable: 50 percent of the reference wage.

In either case, the pension is subject to the minimum of MYR400 per month.

The pension paid to the beneficiary is reduced by a percentage corresponding to employees' contribution rate to the EPF (15 percent). The contribution to the EPF is transmitted by SOCSO. Benefits cease upon reaching age 60.

For cases when insured person incurred different disablement at a different period and as a result is entitled to both invalidity pension and permanent disablement benefit, the total amount of benefit received by the insured person shall not exceed 100 percent of the average monthly wage;

If the invalidity pensioner needs constant attendance, a constant attendance allowance of MYR500 per month is payable.

"Survivors' pension" is payable on the death of an insured employee before age 60, or of an invalidity pensioner. The basic amount of the pension is the invalidity pension actually received by the deceased or which would have been payable if a claim had been made on the date of death. The provision relating to the eligible beneficiaries, and to their shares, is identical to that which applies to the dependents' benefit.

"Funeral benefit" (MYR2,000) is payable on the death of an invalidity pensioner, or of an insured employee before age 60 subject to the satisfaction of the minimum qualifying conditions for Invalidity Pension.

"Rehabilitation benefit" (vocational and physical rehabilitation) is provided to employees who suffer invalidity.

"Dialysis benefit" is provided to employees suffering from chronic renal failure.

Adjustment of benefits

If substantial changes in the general level of earnings result from substantial changes in the cost of living, the situation should be examined, and steps taken to maintain the real value of benefits.

40 Technical Note on Potential Reforms and Other Issues Following the Eleventh Actuarial Valuation of the Employees' Social Security Act



Description of the Employees' Social Security Scheme (as proposed after the closure of Act 4)

Calculations performed in this technical note make use of the comprehensive methodology developed at the Financial, Actuarial and Statistical Services of the ILO for reviewing the long-term actuarial and financial status of national social security systems. These modelling tools include a population model, an economic model, a labour force model, a wage model, a long-term benefits model, a short-term benefits model, and an employment injury model. The calculations have been undertaken by adjusting the version of the ILO models built for the Eleventh Actuarial Review of the ESSS and the first actuarial valuation of SESSS to reflect the proposed changes to the schemes.

The actuarial valuation starts with a projection of the future demographic and economic environment of Malaysia. Next, projection factors specifically related to the ESSS and SESSS are determined and used in combination with the demographic and economic framework.

A2.1 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 like the maximum insurable earnings and the future level of flat-rate benefits.

The selection of projection assumptions takes into account the recent experience of the ESSS and SESSS of SOCSO to the extent this information was available. The assumptions are selected to reflect long-term trends rather than giving undue weight to recent experience.

General population

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

Economic growth

Increase of the GDP growth, wage share of GDP and inflation rates are exogenous inputs to the economic model. The long-term labour productivity, namely GDP per employed, is derived from assumptions on the future evolution of the labour force, wage share of GDP and GDP growth.

Labour force, employment, and insured population

The projection of the labour force, i.e., the number of persons available for work, is obtained by applying assumed labour force participation rates to the projected number of the general population. Unemployment rates are assumed for the future and employment is calculated as the difference between labour force and unemployment.

To reflect the changes brought to the various schemes administered by SOCSO, the projection of the employed population is further classified into local and foreign workers. Furthermore, these categories of workers are even further classified into employees, self-employed and house worker. It allows to conduct the various projections of each scheme according to the potential population that could be covered by SOCSO's schemes.

The model assumes 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 the wage share of 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 present review, the real wage increase is assumed to gradually converge to real labour productivity increase as 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 redistribution of income, for example through minimum and maximum pension provisions. Assumptions on the differentiation of wages by age and sex are established, as well as assumptions on the distribution of wages between different income groups.

A2.2 Modelling the financial development of the SOCSO

The present actuarial review addresses all revenue and expenditure items of the ESSS and SESSS schemes of SOCSO. Income and expenditures under the Employment injury (EI) benefit branch and the Invalidity and survivors' (IS) benefit branch are projected separately using two models specifically developed by the ILO for the two branches of ESSS. Chart A2.1 presents the flow of financial balance projection. The most important components of this budget concern long-term benefits (IS and EI pensions). Pensions are projected separately for each sex and age. For Short-term benefits, income and expenditures are projected using simple projection methods based on recent experience. Chart A2.2 summarizes the projection methodology of insured persons and beneficiaries.

► Figure A2.1 Flow of financial balance projection





Figure A2.2 Projection methodology of insured persons and beneficiaries

Purpose of pension projections

The purpose of the pension model is twofold. Firstly, it is used to assess the financial viability of the long-term benefits of the scheme. This refers to the measure of the long-term balance of the status-quo situation between income and expenditure of the system. In case of imbalance, a revision of the contribution rate or the benefit structure is recommended. Secondly, the model may be used to examine the financial impact of different reform options, thus assisting policymakers 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 system, for the purpose of:

- assessing the reform options to build up a contingency or a technical reserve.
- proposing schedules of contribution rates consistent with the funding objective;
- testing how the system reacts to changing economic and demographic conditions (sensitivity test).

Pension data and assumptions

In addition to the demographic and macro-economic frame already described, pension projections require a set of assumptions specific to the ESSS and SESSS.

The database as of the valuation date includes the insured population by active and inactive status, the distribution of insurable wages among contributors, the distribution of past credited service and pensions in payment. Data are disaggregated by age and sex.

System-specific assumptions such as the disability incidence rates and the distribution of leaving and re-entry by age are determined with reference to the system provisions and the historical experience under the system.

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

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 system's provisions.

Invalidity pensions and permanent disablement benefits are long-term benefits. Hence the financial obligations that a society accepts when adopting financing provisions and benefit provisions for them are also of a long-term nature.

The objective of pension projections is not to forecast the exact development of income and expenditures of the system, but to check its financial viability. This entails evaluating the system with regard to the relative balance between future revenue and expenditure.

Projection approach for benefits other than pensions

The projection of funeral benefits is made by the pension models. In each projection year, the funeral grant per case is multiplied by the number of deceased insured and deceased pensioners.

The projection of the constant attendance allowance (CAA) is done separately for EI and IS branches of ESSS by adapting the pension models. The probability of being awarded a CAA is based on ESSS experience.

The projected cost of temporary disability benefits is the product of the projected number of temporary disability beneficiaries and the average amount of temporary disability benefit. The projected number of temporary disability beneficiaries is obtained by applying an incidence rate (varying by sex and age) to the EI insured population. The incidence rate and the average amount of benefit are based on ESSS and SESSS recent experience. The average amount of benefits is determined as follows:

Replacement rate x SalTD(s,x) x Dur(s,x), where

Replacement rate = 0.80

SalTD(s,x) = (monthly reference salary by sex and age) / 30

Dur(s,x) = average duration of temporary disability by sex and age beyond first three days

The projected cost of the dialysis program is the product of the projected number of beneficiaries and the annual average cost of dialysis. The projected number of beneficiaries by age and sex is obtained by multiplying a prevalence rate by age and sex to the projected insured population by age and sex. The average annual cost

is the same for both sexes and all ages. The prevalence rate and the annual average cost of dialysis are based on ESSS experience. The annual average cost of dialysis is indexed to the salary growth.

As for medical benefits, physical and vocational rehabilitation treatment, health screening facilities, cost of medical and appellate boards, activities promoting safety and health, penalties written off and general expenditure not elsewhere classified, their costs are projected on an aggregate approach. The costs of medical benefits, physical and vocational rehabilitation treatment and other benefits under EI branch are projected separately as percentages of the cost of temporary disability benefits under EI branch. The cost of the health screening program and other benefits under the IS branch is projected as a percentage of the cost of the CAA under the IS branch. The percentages are derived from ESSS recent experience.



ESSS specific data and assumptions following the closure of Act 4

In addition to the demographic and economic assumptions presented in Section 2 of the report called Report to the Government Social Security Organization:the eleventh actuarial valuation of the Employees' Social Security Act as at 31 December 2019, the projection of the future financial development of the Employment Injury and the Invalidity schemes of ESSS following the closure of Act 4 requires a database specific of the system (characteristics of insured persons and pensions in payment) and some particular actuarial assumptions.

A3.1 Data and assumptions on the insured population

Number of insured persons

Insured persons are workers for whom at least one contribution is made during 2019. The 2019 population presented in Table A3.1 and Table A3.2 relates to the population in all age groups, and therefore indicates the coverage of the Employment Injury Branch for local and foreign workers respectively. For the Invalidity Pension Branch, only the population under age 60 and that are not foreign workers is relevant. The respective figures retained for the valuation are as follows:

- Active population of Employment injury Branch: 8,248,526
- Active population of Invalidity Pensions Branch: 6,910,573

Age	Employment injury		ury	Invalidity pensions		
	Male	Female	Total	Male	Female	Total
15-19	189,977	104,709	294,686	189,977	104,709	294,686
20-24	675,437	473,819	1,149,256	675,437	473,819	1,149,256
25-29	755,307	646,055	1,401,362	755,307	646,055	1,401,362
30-34	615,853	498,469	1,114,322	615,853	498,469	1,114,322
35-39	493,870	389,055	882,925	493,870	389,055	882,925
40-44	400,733	306,360	707,093	400,733	306,360	707,093
45-49	343,784	251,264	595,048	343,784	251,264	595,048
50-54	280,616	180,212	460,829	280,616	180,212	460,829
55-59	195,677	109,374	305,051	195,677	109,374	305,051
60-64	83,074	41,685	124,759	-	-	-
65+	34,771	10,110	44,881	-	-	-
Total 15-59	3,951,255	2,959,318	6,910,573	3,951,255	2,959,318	6,910,573
Grand Total	4,069,101	3,011,112	7,080,213	3,951,255	2,959,318	6,910,573

Table A3.1 Insured persons, by age and sex, local workers in 2019

Age		Employment inj	ury
	Male	Female	Total
15-19	46,553	25,660	72,213
20-24	194,127	45,729	239,856
25-29	233,315	36,577	269,892
30-34	198,513	27,811	226,324
35-39	157,832	23,801	181,633
40-44	90,288	16,180	106,468
45-49	41,132	7,453	48,585
50-54	13,854	2,455	16,309
55-59	4,177	565	4,742
60-64	1,501	180	1,681
65+	565	46	611
Total 15-59	979,790	186,231	1,166,021
Grand Total	981,856	186,457	1,168,313

► Table A3.2 Insured persons, by age and sex, foreign workers in 2019

Note: Foreign workers are not covered in the Invalidity Pensions Branch.

The projection of the insured population is calculated by applying constant coverage rates (by age and sex) to the employed population as determined under the assumed economic framework. The salaried employed population was separated by local and foreigner workers, based on the statistics provided by SOCSO on the labour force of Malaysia. Age-specific coverage rates are assumed constant for the whole projection period. Coverage rates appearing in Table A3.3 and Table A3.4 are calculated as the ratio of insured persons to the employed population at the corresponding age for local and foreign workers, respectively.

Age	20	19	2069			
	Male (%)	Female (%)	Male (%)	Female (%)		
17	100	100	100	100		
22	100	100	100	100		
27	74	88	74	88		
32	67	71	67	71		
37	60	62	60	62		
42	67	72	67	72		
47	69	67	69	67		
52	67	72	67	72		
57	63	80	63	80		
62	80	90	80	90		
Total	73	78	71	76		

Table A3.3 SOCSO coverage rates for local workers, by age and sex (2019 and 2069)

Table A3.4 SOCSO coverage rates for foreign workers, by age and sex (2019 and 2069)

Age	20	19	2069		
	Male (%)	Female (%)	Male (%)	Female (%)	
17	46	61	46	61	
22	85	41	85	41	
27	60	23	60	23	
32	79	36	79	36	
37	95	43	95	43	
42	92	39	92	39	
47	73	37	73	37	
52	38	19	38	19	
57	22	10	22	10	
62	23	9	23	9	
Total	73	36	73	35	

Insurable earnings

Table A3.5 shows the average insurable earnings of active contributors for local and foreign workers.

Age Group	Local w	vorkers	Foreign workers		
	Male	Female	Male	Female	
15-19	1,182	1,157	882	884	
20-24	1,775	1,695	1,153	1,074	
25-29	2,350	2,266	1,437	1,367	
30-34	2,635	2,560	1,527	1,375	
35-39	2,760	2,658	1,565	1,342	
40-44	2,836	2,646	1,596	1,300	
45-49	2,830	2,524	1,654	1,320	
50-54	2,777	2,378	1,818	1,431	
55-59	2,713	2,333	2,123	1,860	
60+	2,421	2,140	2,195	1,972	
Average	2,430	2,304	1,427	1,222	

Table A3.5 Average monthly insurable earnings (in MYR)

Source: SOSCO internal data

The average monthly insured salary of the contributing population is derived from the salary class distributions of the employee database. These figures are based on an analysis of contributions in a given month of each year, so that they reflect the actual salary, i.e., they are not affected by the contribution density.

In order to better take into account the effect of minimum and maximum limits on salary-based benefits, the average salary by age and sex is refined into three salary groups, the 30 percent lowest salaries, the 40 percent medium salaries and the 30 percent highest salaries. The distribution of insured persons according to their salary is assumed to remain constant over the projection period. The average salary by age, sex and salary group is projected according to the assumption of wage increase.

Density of contributions

Density of contribution represents the proportion of the year during which the average contributor pays contributions. Density factor by age and sex were obtained from SOCSO. Sample density factors appear in Table A3.6. They remain constant for the full projection period.

Age Group	Local w	orkers	Foreign workers		
	Male	Female	Male	Female	
17	0.44	0.43	0.44	0.43	
22	0.74	0.74	0.74	0.74	
27	0.87	0.88	0.87	0.88	
32	0.89	0.91	0.89	0.91	
37	0.90	0.93	0.90	0.93	
42	0.92	0.94	0.92	0.94	
47	0.92	0.94	0.92	0.94	
52	0.92	0.93	0.92	0.93	
57	0.91	0.92	0.91	0.92	
62	0.86	0.89	0.86	0.89	
Total	0.85	0.88	0.84	0.82	

Table A3.6 Density factors, by age and sex

Accrued past credits

The complete distribution of accrued past credits for the active insured population of local workers obtained from the administrative records of SOCSO is shown in Table A3.7. It evolves during the projection according to the change in the covered population and certain contingencies. For foreign workers, it is assumed that the past service is 0 at the time of the valuation for the purpose of estimating the cost of a modified IS scheme which would cover them.

Credit range	(in month	าร)							
Age	1-12	13-24	25-36	37-48	49-60	61-72	73-84	85-96	97-108
Males									
15-19	70	21	8	1	0	0	0	0	0
20-24	24	24	19	14	9	5	3	1	0
25-29	6	8	11	12	13	13	11	9	7
30-34	2	3	4	4	5	6	7	8	10
35-39	2	2	2	2	3	3	3	3	4
40-44	1	2	2	2	2	2	2	2	2
45-49	2	2	2	2	2	2	2	2	2
50-54	2	2	2	2	2	2	2	2	2
55-59	2	2	2	3	2	2	2	2	2
60+	2	2	3	4	2	2	2	2	2
All ages	12	8	7	6	5	5	4	4	4
Females									
15-19	97	3	0	0	0	0	0	0	0
20-24	56	20	12	7	4	2	0	0	0
25-29	17	12	14	14	12	10	8	6	4
30-34	7	3	4	5	6	7	9	10	11
35-39	7	2	2	3	3	3	3	4	5
40-44	10	3	3	3	3	3	3	3	3
45-49	11	3	3	3	3	3	3	3	3
50-54	12	3	3	3	3	3	3	3	3
55-59	13	3	3	3	3	3	3	3	3
60+	15	4	4	3	3	3	3	3	4
All ages	24	8	7	6	5	5	4	4	4

Table A3.7 Past service distribution of the active population (local workers only), 2019

Credit rar	nge (in mont	ths)						
109-120	121-132	133-144	145-156	157-168	169-180	>180	Total	Average credit (months)
0	0	0	0	0	0	0	100	11
0	0	0	0	0	0	0	100	29
5	3	1	1	0	0	0	100	62
10	10	9	8	6	4	5	100	107
4	5	6	7	8	9	38	100	152
2	3	3	3	3	4	64	100	197
2	2	2	2	2	3	70	100	227
2	2	2	2	2	2	70	100	244
2	2	2	2	2	3	69	100	254
2	2	2	2	2	2	62	100	237
4	3	3	3	3	3	27	100	122
0	0	0	0	0	0	0	100	6
0	0	0	0	0	0	0	100	17
2	1	0	0	0	0	0	100	46
10	9	7	6	4	3	0	100	91
6	7	8	9	11	24	3	100	123
3	4	4	5	8	37	5	100	124
3	3	4	5	7	37	5	100	121
3	3	4	4	6	39	5	100	122
3	3	4	5	7	36	6	100	120
3	4	4	5	6	30	5	100	111
4	3	3	3	4	14	2	100	76

A3.2 Demographic assumptions related to the system

Mortality of insured persons

Mortality rates for the insured population have been assumed to be equal to the mortality rates of the general population (sample mortality rates are presented in Table A3.8). Mortality rates are assumed to decline continuously during the projection period in line with the assumed increase of average life expectancy. This mortality pattern is also used to project survivors' benefits payable on the death of insured persons or pensioners. For disability pensioners of the EI branch, it is assumed that mortality rates are equal to five times those of the general population at age 20, decreasing gradually to twice as much at age 60 and to be equal at age 80. For invalidity pensioners of the IS branch, Table A3.9 shows the adjustment factor used on the mortality rate of the general population. The adjustment is constant throughout the projection period. Mortality adjustments are based on an analysis of the experience in the period 2015-19 through comparison of the observed number of deaths and the expected number based on the mortality table used for the general population.

Age	Ма	ale	Female		
	2019	2069	2019	2069	
0	0.677	0.294	0.586	0.246	
5	0.022	0.011	0.023	0.011	
10	0.031	0.013	0.019	0.010	
15	0.065	0.028	0.025	0.011	
20	0.086	0.039	0.033	0.017	
25	0.096	0.047	0.042	0.023	
30	0.120	0.063	0.058	0.029	
35	0.186	0.095	0.088	0.039	
40	0.290	0.145	0.141	0.067	
45	0.447	0.228	0.228	0.115	
50	0.683	0.352	0.367	0.185	
55	1.009	0.503	0.577	0.276	
60	1.474	0.706	0.875	0.402	
65	2.263	1.057	1.371	0.625	
70	3.515	1.620	2.295	1.085	
75	5.154	2.499	3.962	2.088	
80	7.126	3.861	6.699	3.851	
85	9.507	6.054	11.327	6.733	
90	17.590	9.641	21.640	11.139	
95	76.278	14.410	53.824	16.475	
100	100.000	100.000	100.000	100.000	

Table A3.8 Sample mortality rates (per 100) by age and sex

Age	Male	Female
17	18.58	20.00
22	18.58	20.00
27	16.57	20.00
32	12.44	20.00
37	9.34	16.53
42	7.39	11.44
47	5.34	7.20
52	3.74	4.29
57	2.39	2.51
62	1.81	1.65
67	1.00	1.00
72	1.00	1.00
77	1.00	1.00
82	1.00	1.00
87	1.00	1.00
92	1.00	1.00
97	1.00	1.00

Table A3.9 Adjustment to mortality rate of invalidity pensioners of IS branch, by selected age and sex

Family structure

Information on the family structure of the insured is necessary for the projection of survivors' benefits. Assumptions should be established on the probability of being married at death, the average age of the spouses, the average number of children, siblings, and parents possibly eligible to benefits and their average age. Sample assumptions are shown in Table A3.10 for both local and foreign workers.

Age	Deceased male					
	Spoι	ıse	Orphans a	nd siblings	Pare	nts
	Probability (%)	Average age	Average number	Average age	Average number	Average age
17	1	17	-	-	1.05	47
22	8	21	1.36	13	1.18	51
27	33	26	1.05	10	1.01	55
32	66	30	1.26	6	0.47	59
37	76	35	1.91	7	0.28	63
42	77	39	2.32	10	0.19	67
47	86	44	2.28	13	0.07	71
52	84	48	1.72	14	0.05	75
57	89	53	0.93	16	-	-
62	86	57	0.42	17	-	-
67	83	61	0.05	18	-	-
72	80	66	-	-	-	-
77	77	70	-	-	-	-
82	74	75	-	-	-	-
87	71	80	-	-	-	-

► Table A3.10 Family statistics, local and foreign workers

Age	Deceased female					
	Spouse		Orphans a	nd siblings	Parents	
	Probability (%)	Average age	Average number	Average age	Average number	Average age
17	-	-	-	-	1.48	47
22	17	24	1.34	12	1.26	51
27	28	30	1.11	9	0.70	55
32	32	35	1.42	7	0.34	59
37	38	40	1.76	9	0.23	63
42	46	45	1.91	12	0.22	67
47	53	50	1.78	15	0.13	72
52	59	55	1.13	17	0.03	76
57	57	60	0.44	15	0.02	80
62	41	66	0.13	12	-	-
67	25	71	-	-	-	-
72	10	76	-	-	-	-
77	-	-	-	-	-	-
82	-	-	-	-	-	-
87	-	-	-	-	-	-

A3.3 Data and assumptions specific to the Employment injury scheme

For the demographic and financial projections of the Employment Injury Branch, a certain number of assumptions have to be set. They have been determined by using the experience of the inter-valuation period of the 11th Actuarial Valuation of the ESSS, i.e. 2015 to 2019. Generally speaking, an average of the 5-year experience has been used. Smoothing techniques are used to avoid certain irregularities in the patterns due to small volumes of data. Assumptions are determined by sex and single age. The following tables show the assumptions for selected ages.

Temporary disablement

Table A3.11 and Table A3.12 present the assumptions used for the projection of temporary disablement benefits for local and foreign workers respectively.

		Temporary disablem	ent	
Age	Incid	Incidence		tion (days)
	Male	Female	Male	Female
22	0.0157	0.0042	50.8	44.7
27	0.0145	0.0038	51.5	46.7
32	0.0153	0.0042	55.5	50.3
37	0.0162	0.0050	58.6	54.9
42	0.0169	0.0058	58.9	57.2
47	0.0172	0.0070	58.9	56.3
52	0.0182	0.0096	60.3	58.4
57	0.0198	0.0111	61.6	56.8
62	0.0253	0.0127	61.0	55.2
67	0.0315	0.0145	59.1	59.4

► Table A3.11 Temporary disablement, local workers

		Temporary disablem	ent	
Age	Incid	ence	Average dura	tion (days)
	Male	Female	Male	Female
22	0.0181	0.0048	50.8	44.7
27	0.0167	0.0044	51.5	46.7
32	0.0176	0.0048	55.5	50.3
37	0.0187	0.0057	58.6	54.9
42	0.0194	0.0067	58.9	57.2
47	0.0198	0.0080	58.9	56.3
52	0.0209	0.0111	60.3	58.4
57	0.0228	0.0127	61.6	56.8
62	0.0291	0.0145	61.0	55.2
67	0.0363	0.0167	59.1	59.4

► Table A3.12 Temporary disablement, foreign workers

The temporary disablement incidence rate is applicable to the average insured population.

The average amount of temporary disablement benefits is determined by using the projected earnings by sex and age and applying an adjustment factor of 0.93573 for both local and foreign workers. The amount of pensions is based on earnings of insured and adjusted to take into consideration the difference between the earnings of benefit recipients and those of insured.

Rehabilitation, medical and other benefits

Rehabilitation benefits are projected as 15 percent of the amount of temporary disability benefits. Medical benefits are projected as 2 percent of the amount of temporary disability benefits. As to other benefits that include cost of medical and appellate boards, activities promoting safety and health, penalties written off and general expenditure not elsewhere classified, they are estimated at 10 percent of the amount of temporary disability benefits.

Permanent disablement (including constant attendance allowances)

Several assumptions need to be set for the projection of permanent disablement benefits as a distinction must be made between beneficiaries receiving a pension or a lump sum or a combination of both. The model determines the number of new awards and separates them into appropriate categories of payment by using the variables shown in Table A3.13 and Table A3.14 for local and foreign workers respectively. The incidence of new cases of constant attendance allowances is determined as a proportion of pension awards. The proportions for foreign workers are the same as for local workers as the experience is too limited to be used as a reliable source.

Age	e Permanent disability incidence		% of di awarded	disabled % of pensioners d a pension commuting 20 percer		sioners 20 percent	% of pensioners nt awarded a CAA	
	Male	Female	Male	Female	Male	Female	Male	Female
22	0.00361	0.00082	5.2	3.0	97.2	94.8	6.1	4.0
27	0.00427	0.00091	4.2	2.8	95.1	98.2	5.5	8.5
32	0.00505	0.00118	3.9	2.1	94.6	88.7	4.9	6.5
37	0.00588	0.00163	3.8	2.5	85.6	96.8	3.7	3.3
42	0.00628	0.00198	4.2	2.7	81.8	85.9	2.3	4.7
47	0.00643	0.00231	4.6	3.0	82.1	92.0	2.8	4.3
52	0.00659	0.00325	6.3	3.3	82.4	96.0	4.2	3.9
57	0.00706	0.00356	7.2	3.3	79.9	91.8	3.5	2.3
62	0.00735	0.00322	7.0	4.1	81.2	100.0	7.0	4.8
67	0.00624	0.00242	8.5	6.3	82.5	100.0	9.7	9.7

► Table A3.13 Permanent disablement and constant attendance allowance (CAA) incidence, local workers

► Table A3.14 Permanent disablement and constant attendance allowance (CAA) incidence, foreign workers

Age	Perma disability i	anent incidence	% of di awarded a	sabled a pension	% of pen commuting	sioners 20 percent	% of per awarde	isioners d a CAA
	Male	Female	Male	Female	Male	Female	Male	Female
22	0.00406	0.00092	5.2	3.0	97.2	94.8	6.1	4.0
27	0.00481	0.00102	4.2	2.8	95.1	98.2	5.5	8.5
32	0.00568	0.00133	3.9	2.1	94.6	88.7	4.9	6.5
37	0.00662	0.00183	3.8	2.5	85.6	96.8	3.7	3.3
42	0.00707	0.00223	4.2	2.7	81.8	85.9	2.3	4.7
47	0.00723	0.00259	4.6	3.0	82.1	92.0	2.8	4.3
52	0.00742	0.00365	6.3	3.3	82.4	96.0	4.2	3.9
57	0.00794	0.00401	7.2	3.3	79.9	91.8	3.5	2.3
62	0.00827	0.00362	7.0	4.1	81.2	100.0	7.0	4.8
67	0.00701	0.00272	8.5	6.3	82.5	100.0	9.7	9.7

Table A3.15 shows the average degree of disablement separately for the pensioners (including those commuting part of their pension) and those receiving a lump sum only.

Age	Beneficiaries receiving an income	Beneficiaries receiving a lump sum only
22	44.8	4.4
27	45.4	4.3
32	40.3	4.4
37	36.4	4.6
42	33.9	4.6
47	37.0	4.6
52	34.5	4.8
57	32.5	4.9
62	38.0	5.2
67	43.1	5.7

► Table A3.15 Average degree of disablement, local and foreign workers (percent)

Work-related deaths

The model generates the work-related deaths (including commuting accidents) by applying a coefficient to the total number of deaths. Table A3.16 and Table A3.17 present the coefficients applied in 2020 for local and foreign workers respectively. In the projection period, the coefficients are increased annually by 0.5 percent in order to partially offset the impact of mortality improvement for all causes. It is therefore assumed that the frequency of work-related accidents will decrease more slowly than the mortality rates in the population⁵. The survivors' pensions are determined by using the assumptions related to the family composition.

Table A3.16 Proportion of deaths due to work-related accidents and diseases, local workers

Age	Male %	Female %
22	37.7	14.5
27	21.1	6.9
32	14.5	4.6
37	9.0	2.5
42	5.3	2.1
47	4.2	1.5
52	3.3	1.4
57	3.3	1.0
62	5.6	1.4
67	4.5	0.8

5 This assumption is added to avoid underestimation of costs for work-related deaths. Generally, there is no evidence that safety and security at workplace will improve as fast as the general health condition of the general population.

Age	Male %	Female %
22	44.2	17.1
27	24.8	8.1
32	17.1	5.4
37	10.6	2.9
42	6.2	2.4
47	4.9	1.8
52	3.9	1.7
57	3.9	1.2
62	6.6	1.7
67	5.2	1.0

Table A3.17 Proportion of deaths due to work-related accidents and diseases, foreign workers

The amount of pension is based on earnings of the insured members and adjusted to take into consideration the difference between the earnings of benefit recipients and those of the insured. Adjustment factors are shown in Table A3.18.

Table A3.18 Adjustment factors in calculation of benefits, local and foreign workers

Benefit	Male	Female
PDNew awards (Periodical)	84%	72%
PDNew awards (LS only)	106%	91%
Death benefit	91%	78%

Table A3.19 shows the replacement rates that are used in projecting survivors' benefits. The replacement rates defined by the scheme provisions are adjusted to take into account the survivors' degree of dependency.

Table A3.19 Adjusted replacement rates of survivors' benefits, local and foreign workers

Beneficiaries	Male insured	Female insured
Widow(er)s	60%	60%
Orphans	34%	34%
Parents	27%	27%

A3.4 Assumptions specific to the Invalidity scheme

For the projection of benefits under the invalidity scheme, the same approach as in the employment injury branch has been used. Specific assumptions need to be determined for the invalidity pensions and the dialysis program. The assumptions related to survivors' benefits (mortality and family composition) have been described in previous sections.

Invalidity incidence

Table A3.20 presents the incidence of invalidity pensions and grants as well as of constant attendance allowances, which are determined as a proportion of pension awards. The incidence rates of invalidity are applied to the active insured population and the eligibility to a pension or grant is determined by the model based on the distribution of insured by years of past service credits.

Age	Invalidity	incidence	CAA awarded as % of invalidity pensions and grant	
	Male	Female	Male	Female
22	0.00006	0.00003	22	18
27	0.00018	0.00014	17	12
32	0.00044	0.00040	13	10
37	0.00092	0.00085	13	10
42	0.00186	0.00165	11	11
47	0.00320	0.00311	11	8
52	0.00616	0.00555	9	7
57	0.01115	0.01006	7	8

► Table A3.20 Incidence of Invalidity

Table A3.21 presents the termination rates of invalidity pensions for reasons other than death.

► Table A3.21 Termination of invalidity

Age	Male %	Female %
22	0.08486	0.08186
27	0.08096	0.08196
32	0.07725	0.08205
37	0.05892	0.07841
42	0.07032	0.07493
47	0.07396	0.06924
52	0.06997	0.05007
57	0.05412	0.03584

Dialysis program

The demographic projection of the number of beneficiaries is carried out by applying an annual prevalence rate to the entire population covered. The prevalence rate was established at 0.26752 for the year 2019. It is then adjusted annually taking into account the variation in the composition of the covered population by sex and age. This adjustment is made by applying age-sex prevalence rates to the covered population in each projection year. These prevalence rates are based on the experience observed from 2015 to 2017. Due to database limitations, it was not possible to establish prevalence rates based on the entire period ending with the assessment year, which would have been 2015-2019. The data base includes cases benefitting from dialysis at ages above 59. Those cases were distributed in proportion to the number of cases in the lower ages for the purpose of establishing prevalence rates that match the covered population age range (ages 15 to 59). The adjustment factor increases steadily in the first 30 years of the projection period and then stabilizes at about 1.45 for the remainder of the projection period.

The financial projection is established by multiplying the number of projected cases by the average annual cost of dialysis per beneficiary. The average amount was set at MYR16,189 in 2020 and it is assumed to vary annually according to the average wage variation. Because of data base limitations, it was not possible to assess the possible impact of age and sex on the evolution of the average annual cost.

Dialysis is a long-term treatment which is likely to last during the lifetime of the patient with end-stage renal disease unless a kidney transplant replaces the dialysis. The projection of the program cost would be improved if cohort panel data on the beneficiaries were available. The database would then allow to identification of the following information for each dialysis beneficiary: identification number, sex, date of birth, date of beginning of dialysis, date of end of dialysis and reason. The identification number of the beneficiary should allow inquiry into other databases for specific analysis (ex. social-economic environment of the patients, health history).

A3.5 Other assumptions

Physical and vocational rehabilitation in Invalidity branch

Detailed information on the physical and vocational rehabilitation claims was not provided to the actuaries (information covered years 2015 and 2016 for the incidence, no information was provided on age specific benefit cost). Hence, a simplified method was used to project the cost of this specific benefit of the IS branch. They are estimated at 80 percent of the amount of constant attendance allowances. This assumption was derived using the experience of the last 9 years of the IS branch.

The projection of the program cost would be improved if cohort panel data on the beneficiaries were available. The database would then allow identification of the following information for each rehabilitation beneficiary: identification number, sex, date of birth, date of beginning of rehabilitation, date of end of rehabilitation and its outcome. The identification number of the beneficiary should allow inquiry into other databases for specific analysis (ex. social-economic environment of the patients, health history).

Other benefits in Invalidity branch

Other benefits in the Invalidity branch include activities promoting safety and health, penalties written off and general expenditure not elsewhere classified. They are estimated at 40 percent of the amount of constant attendance allowances.

Adjustment factors applied to the earnings used in determining pension amounts

Table A3.22 shows the adjustment factors that are applied to the earnings used in determining newly awarded pension amounts of the projection period in order to take into consideration the difference between the earnings of benefit recipients and those of other insured.
Table A3.22 Adjustment factors in calculation of benefits

Benefit	Male	Female
Invalidity pension	81%	71%
Survivors' pension	77%	70%

Table A3.23 shows the replacement rates that are used in projecting survivors' benefits. The replacement rates defined by the scheme provisions are adjusted to take into account the survivors' degree of dependence.

Table A3.23 Adjusted replacement rates of survivors' benefits

Beneficiaries	Male insured	Female insured
Widow(er)s	60%	60%
Orphans	40%	40%
Parents	31%	37%

Indexing of system's parameters and pensions in payment

Maximum insurable earnings are MYR4,000 per month on 1 January 2020. For the remainder of the projection period, the maximum insurable earnings are indexed annually in line with the increase of the national average wage. The MIE indexation is reflected in the maximum benefits and in other fixed parameters of the system from 1 January 2021.

The pensions in payment are assumed to increase annually from 1 January 2020 in line with the CPI.

Administrative expenses

For 2020, administrative expenses have been set at 14.0 percent of benefits in order to match as closely as possible those of the previous year, taking into account an increase due to inflation and wages. For the years 2021-2028, the factor applied to benefits increases by 0.25 each year until it reaches 16.0 percent in 2028. During the period 2005-2019, the average ratio of administrative expenditure to benefits was 15.8 percent.

In 2029 and after, administrative expenditures increase in line with the variation of average salaries. The allocation of administrative expenditure by branch is discussed in the report. Projections under the base scenario apply the current allocation formula (55 percent for EI and 45 percent for IS).

Impact of proposed changes in the new Act

In the projections performed in this technical note, to the following assumptions were adopted in relation to the specific proposed changes to the EI and IS branch of ESSS:

- The impact of the revised schedule of injury is set to nil based on an analysis of a sample of claims conducted by SOCSO. The sample provided by SOCSO is related to the most frequent claims. It does not show a clear pattern on the impact of the benefits amounts paid (i.e. some injured will lose benefit entitlement, others will have increased benefits).
- The contemplated change related to the maximum pension amount from all sources being at 100 per cent does not have an impact on the projections. This assumption is based on data provided by SOCSO. The analysis shows that the impact is below the threshold of materiality considered in the modelling. While the proposal is a good governance practice (beneficiaries of social security benefits should not

receive more income compared to their situation before the accident), it will not have a material impact of the overall financial situation of the EI branch.

A3.6 Pensions in payment in December 2019 - Employment injury benefits branch

Age	Male		Female	
	Number	Average monthly pension	Number	Average monthly pension
15-19	127	405	93	390
20-24	360	475	37	435
25-29	846	518	99	499
30-34	1,616	497	173	465
35-39	2,141	487	268	430
40-44	2,599	501	294	423
45-49	2,970	499	377	381
50-54	2,779	506	473	367
55-59	2,407	516	492	383
60-64	1,856	500	417	382
65-69	1,222	507	273	401
70-74	584	495	135	345
75+	383	426	129	368
Total	19,890	500	3,260	396

Table A3.24 Permanent disablement pensions, local workers

Age	Male		Fe	male
	Number	Average monthly pension	Number	Average monthly pension
15-19	-	-	-	-
20-24	1	700	-	-
25-29	-	-	-	-
30-34	1	1,093	-	-
35-39	-	-	-	-
40-44	-	-	-	-
45-49	1	1,212	-	-
50-54	-	-	-	-
55-59	-	-	-	-
60-64	-	-	-	-
65-69	-	-	-	-
70-74	-	-	-	-
75+	-	-	-	-
Total	3	1,002	-	-

► Table A3.25 Permanent disablement pensions, foreign workers

Age	Male		Fe	emale
	Number	Average monthly pension	Number	Average monthly pension
15-19	13	818	1	675
20-24	106	961	2	841
25-29	403	995	25	1,026
30-34	914	939	56	870
35-39	1,329	884	64	798
40-44	1,665	905	78	807
45-49	1,926	974	76	829
50-54	2,045	1,032	94	820
55-59	1,943	1,019	80	798
60-64	1,665	966	75	838
65-69	1,236	872	40	691
70-74	675	812	14	607
75+	619	747	28	504
Total	14,539	943	633	802

► Table A3.26 Widows and widowers' pensions according to sex of dead spouse, local workers (EI)

Age	Orphans & Siblings		Age	Ра	rents
	Number	Average monthly pension		Number	Average monthly pension
0-4	5,437	506	Less than 40	72	406
5-9	1,551	504	40-44	227	326
10-14	1,917	460	45-49	824	334
15-19	4,411	570	50-54	1,753	335
20-24	178	1,465	55-59	2,571	366
25-29	17	942	60-64	2,779	396
30-34	21	1,045	65-69	2,257	427
35-39	14	944	35-39	1,329	453
40-44	9	1,031	40-44	781	488
45-49	12	894	45-49	425	488
50+	2,302	490	85+	144	525
Total	15,869	528		13,162	398

► Table A3.27 Orphans, siblings and parents' pensions, local workers (EI)

Age		Male
	Number	Average monthly pension
15-19	1	-
20-24	18	5
25-29	37	4
30-34	64	11
35-39	75	11
40-44	104	12
45-49	96	8
50-54	80	9
55-59	75	11
60-64	56	5
65-69	40	6
70-74	18	1
75+	6	1
Total	670	84

► Table A3.28 Constant attendance allowance beneficiaries, local workers

For foreign workers, there is no constant care allowance payable as of 31 December 2019.

A3.5 Pensions in payment in December 2019 - Invalidity benefits branch

Age		Male	F	emale
	Number	Average monthly pension	Number	Average monthly pension
15-19	57	865	56	849
20-24	67	709	33	650
25-29	394	787	209	768
30-34	1,019	906	642	829
35-39	1,901	969	1,199	877
40-44	3,480	1,061	2,084	940
45-49	5,062	1,166	3,018	950
50-54	7,699	1,201	4,387	915
55-59	10,546	1,274	6,099	909
60-64	7,614	1,195	4,862	813
65-69	2,715	1,026	2,578	676
70-74	1,492	983	1,515	599
75+	616	824	869	546
Total	42,662	1,156	27,551	845

► Table A3.29 Invalidity pensions

Age	Male		Female		
	Number	Average monthly pension	Number	Average monthly pension	
15-19	18	472	6	303	
20-24	196	468	18	462	
25-29	1,216	503	190	491	
30-34	3,821	505	691	496	
35-39	7,316	490	1,354	472	
40-44	12,173	502	2,218	452	
45-49	17,242	576	2,753	484	
50-54	21,617	629	3,417	523	
55-59	21,104	632	3,635	572	
60-64	14,457	577	3,070	567	
65-69	8,204	513	1,653	490	
70-74	3,644	462	669	439	
75+	1,704	408	422	366	
Total	112,712	569	20,096	512	

► Table A3.30 Widows and widowers' pensions according to sex of dead spouse (IS)

Age	Orphans & Siblings		Age	Parents	
	Number	Average monthly pension		Number	Average monthly pension
0-4	42,546	298	Less than 40	199	352
5-9	11,471	287	40-44	141	188
10-14	15,743	289	45-49	705	182
15-19	41,019	349	50-54	2,230	194
20-24	2,013	717	55-59	4,465	209
25-29	295	504	60-64	6,150	228
30-34	216	719	65-69	6,260	260
35-39	146	497	35-39	4,602	285
40-44	68	496	40-44	3,284	325
45-49	-	-	45-49	1,871	345
50+	17,823	301	85+	659	382
Total	131,340	320		30,566	258

Table A3.31 Orphans, siblings, and parents' pensions (IS)

► Table A3.32 Constant care allowance beneficiaries

Age	Male	Female
15-19	-	-
20-24	28	15
25-29	78	26
30-34	152	87
35-39	283	131
40-44	471	228
45-49	583	292
50-54	902	380
55-59	1,037	521
60-64	841	375
65-69	264	141
70-74	96	61
75+	41	23
Total	4,776	2,280

Industry code	Industry	Salaries	Compensation costs
1	Agriculture, forestry, and fishing	13,213	121
2	Mining and quarrying	3,280	31
3	Manufacturing	139,400	1,035
4	Electricity, gas, water, and sanitary services	20,550	82
5	Construction	50,910	611
6	Wholesale trade	71,474	274
7	Retail trade	19,716	243
8	Accommodation and food services activities	25,032	107
9	Transportation and storage	20,711	351
10	Financial and insurance/takaful activities	38,829	121
11	Real estate, leasing and business	81,453	384
12	Public administration and defence / Compulsory social security	105,679	797
13	Education	5,008	22
14	Health and social work	16,213	100
15	Other community, social and personal services activities	54,110	21
16	Private household with employed person	5,569	448
17	Activities and extraterritorial organisations and bodies	3,334	46
Total		674,481	4,794

Table A3.33 Data used in the calculation of industry rates 2015-2019 (MYR million)



Projected demographic and macroeconomic environment of Malaysia

Future income and expenditure of the SOCSO scheme will be closely linked to changes in the size and age structure of the population of the country, employment levels, economic and wage growth, inflation, and rates of return on investments. Therefore, in order to estimate future SOCSO finances, a projection of Malaysia'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. Population and economic projections are interrelated. They are thus performed together to ensure consistency of results.

Demographic and macroeconomic variables were projected for a period of 50 years, following an analysis of past trends and an estimate of plausible future experience. Population and economic projections are an intermediary step to derive SOCSO's scheme projections.

A4.1 Population projection

The determinants of future population changes are fertility, mortality, and net migration. Fertility rates determine the number of births, while mortality rates determine how many, and at what ages people are expected to die. Net migration represents the difference between the number of people who permanently enter and leave Malaysia.

For this valuation, the estimate of the population of the reference year of this valuation (2019) is 32,522,800. It

was extracted from the World Population Prospects 2019 (WPP) published by the United Nations in 2019⁶. This publication is the main source of the assumptions used for the projection of the population.

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 about 2.1 is required for each generation to replace itself. The TFR in Malaysia has declined steadily from 2.93 in 2000 to 2.19 child per woman in 2012 and has been under the replacement level since 2013. Table A4.1 shows the assumptions used for this actuarial valuation. The retained assumption is to use the TFR in 2019 as mentioned by DoS (1.78) and to linearly amortize it until 2050, where the assumption is to use WPP projections for TFR.

► Table A4.1 Total fertility rate assumption

Year	Total fertility rate
2019-24	1.77
2025-29	1.76
2030-34	1.75
2035-39	1.74
2040-44	1.72
2045-49	1.71
2050-54	1.70
2055-59	1.70
2060-64	1.69
2064-69	1.69

Source: Dos, WPP 2019 and authors' calculation

Mortality

According to the DoS, life expectancy at birth is estimated at 72.4 years for males and 77.4 years for females in 2019. For this valuation, statistics of DoS are used as a starting point, and mortality converges back in 2030 to improvements in life expectancy and mortality that are assumed to occur in accordance with UN estimates. Under this pattern of mortality improvements, it is projected that life expectancy at birth will reach 82.0 years for males and 84.4 years for females in 2069.

Migration

For this valuation, net migration is assumed to occur in accordance with WPP 2019. The annual net migration fluctuates between 50,000 and 48,800 in the period 2020-2050 and is set constant at 48,800 thereafter. According to the model, the number of immigrants is double the number of those emigrating each year and both groups are evenly distributed by sex while the distribution by age is different for each group and by sex at adult ages.

⁶ United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition. Rev. 1.

Projected population

Figure A4.1 presents the projected population of Malaysia from 2019 to 2069 separated into three age categories: children (0-14), persons who can potentially be insured under both branches of SOCSO scheme (15-59) and persons at pensionable age (60 and over). The evolution of the relative size of each age-group (notably the slight decrease of the population of children and the increase of the number of persons at pensionable age) illustrates the projected ageing of the population of Malaysia.



Figure A4.1 Projected population of Malaysia, by age groups (2019-2069)

Table A4.2 presents detailed population projections. We observe that the total population will increase steadily from 32,222,800 in 2019 to 43,268,767 in 2069. The number of persons aged 15 to 59 will increase from 21,509,000 in 2019 to 25,228,729 in 2049 and then decrease to 23,057,221 in 2069.

Year	Total	Age			
		0-14	15-59	60 & over	
2019	32,522,800	7,652,300	21,509,000	3,361,500	
2029	36,198,369	7,731,174	23,571,538	4,895,656	
2039	39,187,066	7,554,367	25,146,860	6,485,839	
2049	41,210,788	6,990,163	25,228,729	8,991,896	
2059	42,605,437	6,835,863	23,777,370	11,992,203	
2069	43,268,767	6,723,918	23,057,221	13,487,628	

Table A4.2 Projected population of Malaysia (2019-2069)

A4.2 Macroeconomic framework

Economic growth

The actuarial valuation and this technical note are being carried out in an unprecedented context due to the impacts of the COVID-19 pandemic. For this reason, establishing assumptions is subject to more uncertainty than in normal circumstances. Even though there seems to be a consensus that the economy will return to some normality after a period of transition, it can nevertheless be expected that the context will be different from what it would have been in the absence of the pandemic. For example, significant progress has been made in the digitalization of the economy which will have an impact on the labour market. The purpose of this note is to highlight over the long-term the financial implications of the proposed changes and reforms described above. It aims to accurately predict the period of return to normality and its usefulness and relevance is not compromised by discrepancies between assumptions and what is observed in the first years of projections. This is particular the case in this note as the reforms are generally estimated to take effect from 1 January 2024 only.

Figure A4.2 shows that the GDP increased steadily over the 15 years ending in 2019 except in 2009 due to the financial crisis. The average growth during these 15 years has been 4.9 percent. The country recovered rapidly from the Global Financial Crisis in 2009, recording growth rates averaging 5.3 percent since 2010. In 2019, before the start of the pandemic, sustained growth of real GDP was expected at around 4.7 percent per annum for the decade ending in 2030⁷.

7 Ministry of Economic Affairs Malaysia, Shared Economic Vision 2030, 2019.



Figure A4.2 Real GDP growth of Malaysia (2005-2019)

Source: Department of Statistics of Malaysia.

The GDP assumptions used are as follows. In the short term, we have relied on the outlook of the Ministry of Finance⁸, which is a decline of 4.5 percent in 2020 followed by a rebound of 6.9 percent in 2021. For 2022 to 2025, the IMF's estimates, i.e. a growth rate decreasing from 6 percent to 5 percent have been used. For the subsequent 5 years, the assumption is a linear decrease from 5 percent to 3.5 percent in 2030.

From 2031 to 2035, GDP growth is constant at 3.5 percent and thereafter the change depends on the productivity per worker and the employed population.

The long-term assumption on GDP growth is the result of assumptions on the future evolution of the labour force, the wage share of GDP and labour productivity (discussed below).

Productivity

The assumptions on the growth of GDP and the employed population lead to a decrease in productivity per worker in 2020 followed by a resumption of growth. For the first 5 years of projection, i.e. for the period 2020-2024, productivity grows by an average of 2.4 percent per year. From 2025, the productivity growth of 3.5 percent gradually decreases to 2.6 percent in 2035 and decreases linearly to 2.5 percent in 2069.

The growth of compensation to employees as a proportion of GDP is a key indicator by the government to measure the development of the country. In the 2015-2020 plan, the objective was to increase this from 34.9 percent in 2015 to at least 40 percent in 2020. Progress has been slower than expected and the objective was not achieved. In the revision of the 2015-2020 plan, the government set its new target for 2020 at 38 percent while recalling that the target must be greater than 40 percent in the medium term to reach that of high-income

countries. For the purposes of this actuarial valuation, the assumption used is that the objective of 40 percent will be reached in 2035 and that it will increases at a reduced pace to reach 42.1 percent in 2069.

Year	Real GDP growth (%)	Increase in productivity per worker (%)	Increase in the number of workers (%)	Labour income share in GDP (%)
2020	-4.5	-4.1	-0.4	35.9
2021	6.9	4.6	2.2	35.9
2022	6.0	4.1	1.8	35.9
2023	5.7	4.0	1.7	36.2
2024	5.3	3.7	1.6	36.5
2029	3.8	2.6	1.1	38.1
2039	3.0	2.6	0.4	40.5
2049	2.4	2.6	-0.2	41.1
2059	2.0	2.5	-0.5	41.6
2069	2.2	2.5	-0.3	42.1

Table A4.3 Projected GDP growth, productivity, and total employment

Labour force

It is assumed that the total participation rates for males will stay constant at the level of 2019 for the entire projection period while it is assumed that the total participation rate of females will increase from 55.6 percent in 2019 to 60.0 percent in 2035 in accordance with the objective of the government. Age-specific participation rates remain constant from 2037. Fluctuations in the total participation rates are due to changes in the age composition of the population.



Figure A4.3 Projected total participation rate, by sex (2019-2069)

Unemployment rates have been relatively stable during the period 2015-2019 with an average of 3.1 percent for males and 3.6 percent for females. Young people from the age of 15 to 25 years account for about two thirds of the unemployed.

For 2020 and 2021, the unemployment rates are those forecast by the Ministry of Finance. The forecast for 2020 is 4.3 for both genders. The 2021 rates, respectively 3.0 percent for males and 4.4 percent assume a return to normal after the pandemic year. The age-specific rates of 2021 have been used for the remainder of the projection period. Fluctuations in the total unemployment rates are due to changes in the age composition of the population.

The distribution of the employed population between salaried workers, self-employed and unpaid family workers of 2019 by sex and age has been assumed to remain constant over the projection period.

(in thousands)	2019	2029	2039	2049	2059	2069
Total population	32,523	36,198	39,187	41,211	42,605	43,269
Male	16,765	18,527	19,951	20,892	21,527	21,819
Female	15,758	17,672	19,236	20,319	21,078	21,450
Population 15-64	22,680	25,062	26,913	27,831	26,781	25,548
Male	11,759	12,929	13,853	14,251	13,618	12,954
Female	10,922	12,133	13,060	13,580	13,163	12,593
Labour force 15-64	15,582	17,744	19,224	19,351	18,549	17,824
Male	9,462	10,502	11,205	11,284	10,742	10,294
Female	6,119	7,242	8,019	8,067	7,808	7,530
Participation rate	69%	71%	71%	70%	69%	70%
Male	80.5%	81.2%	80.9%	79.2%	78.9%	79.5%
Female	56.0%	59.7%	61.4%	59.4%	59.3%	59.8%
Employed (15-64)	15,073	17,199	18,675	18,804	18,027	17,327
Male	9,202	10,234	10,939	11,020	10,492	10,055
Female	5,871	6,965	7,736	7,783	7,535	7,271
Salaried (15-64)	11,180	12,596	13,368	13,224	12,688	12,238
Male	6,835	7,488	7,805	7,722	7,355	7,078
Female	4,345	5,108	5,563	5,502	5,333	5,159
Self-Employed (15-64)	3,316	3,961	4,582	4,819	4,609	4,391
Male	2,160	2,554	2,946	3,109	2,956	2,805
Female	1,155	1,407	1,636	1,711	1,653	1,586
Unemployed	508	546	549	547	523	497
Male	260	268	266	264	250	239
Female	248	277	282	284	273	258
Unemployment rate	3.3%	3.1%	2.9%	2.8%	2.8%	2.8%
Male	2.7%	2.6%	2.4%	2.3%	2.3%	2.3%
Female	4.1%	3.8%	3.5%	3.5%	3.5%	3.4%

Table A4.4 Labour market balance (2019-2069)

Inflation

Historically, inflation has been under control with an average annual rate of 2.4 percent since 1995. The annual average rate of inflation (ratio of the average CPI for the 12 months of a calendar year to the average CPI of the 12 months of the preceding year) was 1.9 percent over the last 5 years.

Table A4.5 Historical inflation rates in Malaysia (1995-2019)

Period	Inflation rate (%)
1995-99	3.5
2000-04	1.5
2005-09	2.9
2010-14	2.4
2015-19	1.9
1995-2019	2.4

Source: Department of Statistics of Malaysia

For the first two years of projections, the forecasts of the Ministry of Finance concerning the variation of the CPI were adopted. Due to the pandemic, deflation is observed in 2020 (-1.0 percent) while a return to normal conditions is expected in 2021. For the years 2022 to 2025, the IMF forecasts were used. Beginning in 2026, we assumed that the projected variation of 2.0 percent in 2025 would increase to 2.5 percent in 2030 where it is assumed constant thereafter.

Wage increases

The real wage increase is assumed to gradually converge towards the productivity per worker, as it is expected that wages will adjust to efficiency levels over time. After a downturn in 2020 where the estimate is a decrease of the nominal salary of 4.4 percent, the increase of the nominal average salary is linked to the evolution of the share of compensation of employees. Therefore, the assumed nominal wage increases will be in the 6.0-7.0 percent range until 2035 and will decrease gradually to slightly above 5 percent in 2045 and thereafter.

Rate of return of the SOCSO fund

For social security programs such as the SOCSO programs, under which most of the benefits (and related actuarial liabilities) are fully sensitive to price inflation, the rate of return parameter which is most pertinent for actuarial projection purposes is the real rate of return, i.e. the rate of return in excess of price inflation. For the actuarial valuation as of December 31, 2019, the real rate of return assumption was set at 2.5 percent per annum which was the same as that used in the 10th Actuarial Valuation.

The methodology traditionally used in the actuarial profession for setting appropriate return assumption is referred to as the "building block" method. Under such a method, a long term expected rate of return is set for each asset category and the overall return assumption to be used for actuarial purposes is determined as the weighted average of these expected long-term rates of return, the weight given to each asset category corresponding to the long-term allocation to such asset category under the investment policy adopted for the program. The long term expected rate of return for each asset category is determined by adding to the price inflation assumption, the real rate of return expected for no-risk investment instruments (i.e. short-term government issues) and for other asset categories, the expected "risk premia" inherent to any such asset category, i.e. remuneration expected by the market investors as a compensation for the various risks inherent to the asset category.

For the 11th actuarial valuation, the long-term real rate of return was assumed to be equal to 2.5 percent except for the first 10 projection years where shorter-term forecasts were adopted. More details on the justification for this assumption are set out in the 11th actuarial valuation report. This assumption is adopted for the analysis in this report.

Table A4.7 presents the evolution of inflation, average wage growth and nominal rate of return that are assumed over the projection period.

Year	Inflation rate (%)	Annual nominal increase of average wage (%)	Rate of return of the Fund (%)
2020	-1.0	-4.4	4.5
2021	2.5	6.6	4.6
2022	1.9	6.0	4.6
2023	1.9	6.9	4.7
2024	2.0	6.9	4.7
2029	2.4	6.0	5.1
2039	2.5	5.4	5.1
2049	2.5	5.3	5.1
2059	2.5	5.2	5.1
2069	2.5	5.2	5.1

Table A4.7 Projected inflation rate, wage increase and rate of return of the Fund

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