



Workers' Compensation Insurance in Korea

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Workers' Compensation & Welfare Service, Korea

1. Compensation system

2. Financial issues

3. How to calculate Loss Reserve

1. Compensation system

1. Major Characteristics of the WCI Scheme

Social security scheme to compensate a worker exposed to a work-related accident for consequent injury or disease

1. Korea's First Introduced Social insurance

- WCI : 1964
- Health Insurance : 1977
- National Pension : 1988
- Employment Insurance : 1995

2. Employer's Responsibility

- Compulsory application
- No-fault rule

3. Limitative Compensation Liability

- Compensation based on the average wage of workers according to the limitative rates specified in the law

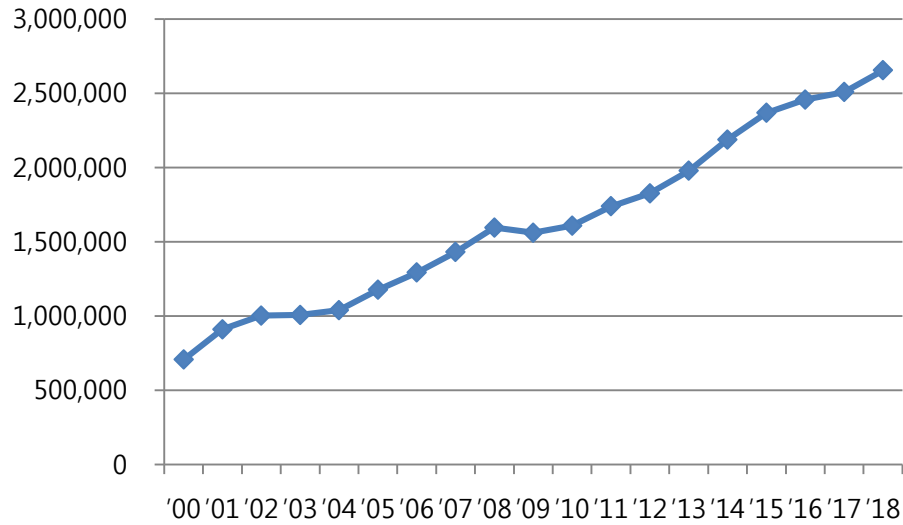
4. Independent review board

- Operation of the review committee

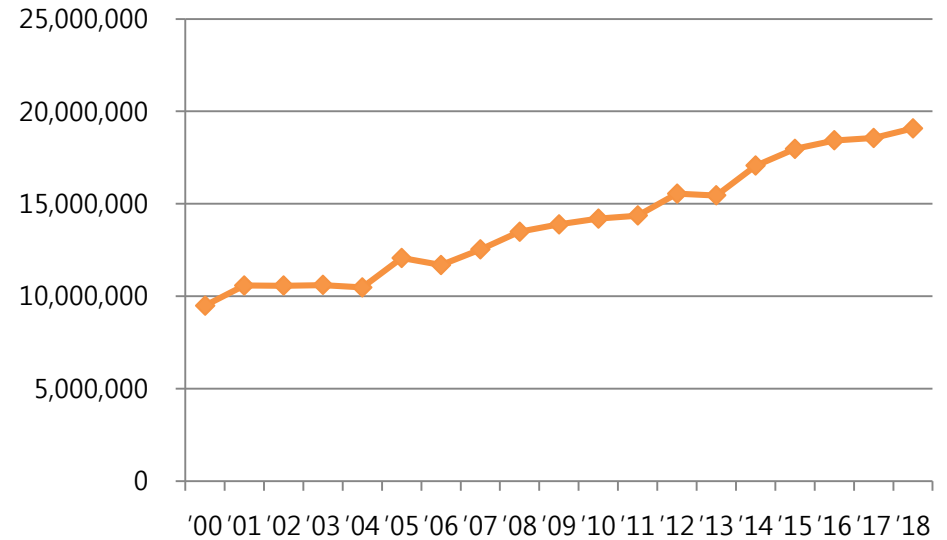


2. Growth in coverage

No. of covered workplaces

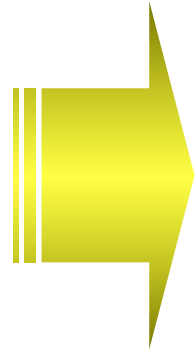


No. of insured workers



	2000	2018
Covered Workplaces	706,231	2,654,107
Insured Workers	9,485,557	19,073,438

3. Who gets the compensation?



Caused by occupational reasons

**injury · disease · disability or death
of workers (provision 1 of article 5)**

- **Scope of work**
 - Any duty based on the employment contract under the control and management of the employer
 - Any act accompanying the worker's duty or any act required for the commencement, performance or continuation of the worker's duty
 - ※ Excluding material damages
- **Outside of the occupation**
 - Suicide · Self-harm · Intentional or Criminal acts
 - ※ Except for self-harm under the mental decline due to occupational reasons

4. Procedure of recognizing an occupational disease



- Accident during duty
- Hospital transfer



- Medical care benefit application



- Investigation of the accident



- Decision of medical care due to an occupational accident
- Notification

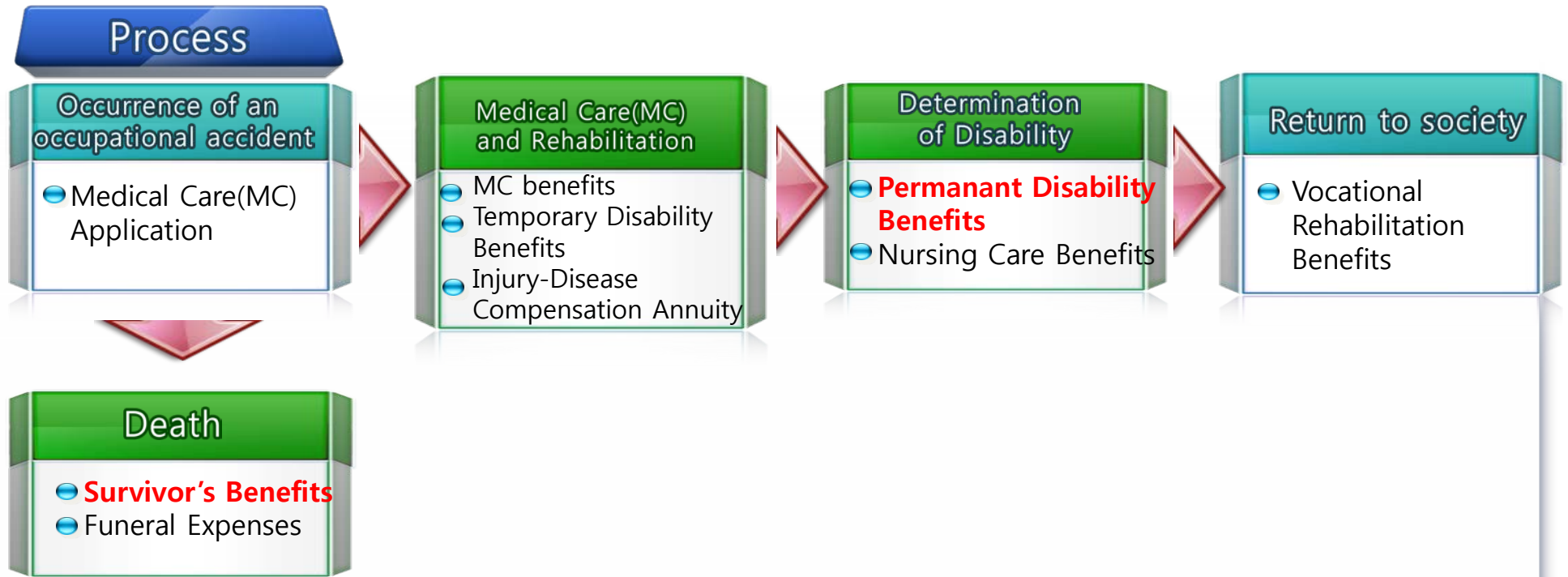


- Review by Occupational Disease Adjudication Committee



- Medical consultation

5. WCI Benefits



6. Limitative Compensation Liability

- ◆ Insurance benefits are calculated based on the "**Average wages**" according to the **Labor Standards Act**.
 - **The average wage is increased or decreased each year** to guarantee the real wage of recipients of long-term benefits such as pensions.
 - **Maximum or minimum standard amount of compensation is set** to solve the issues of over- or under- insurance payment.

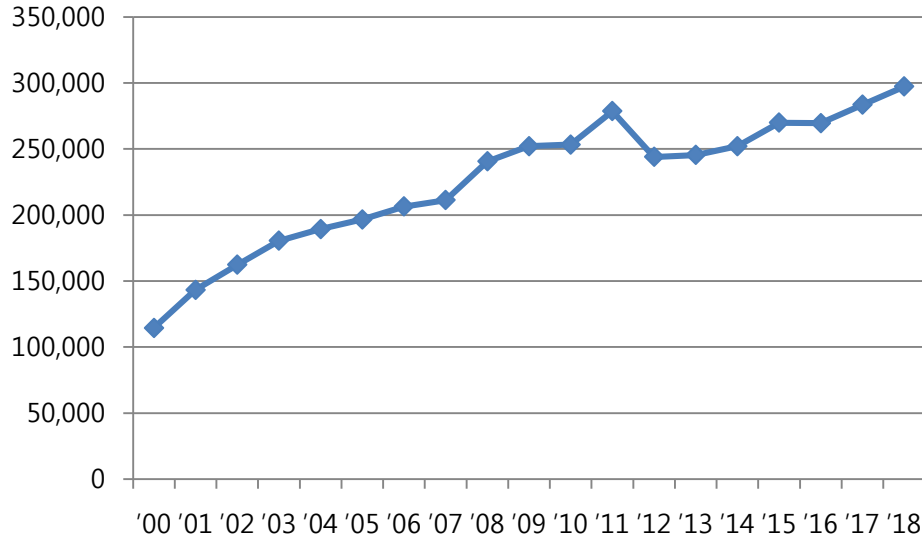
Provision 1 of article 2
in the Labor Standards Act

$$\begin{aligned} \text{◆ Average wages} &= \frac{\text{The total wage for the previous 3 Months before the date of occurrence}}{\text{The total number of days for the previous 3 Months before the date of occurrence}} \end{aligned}$$

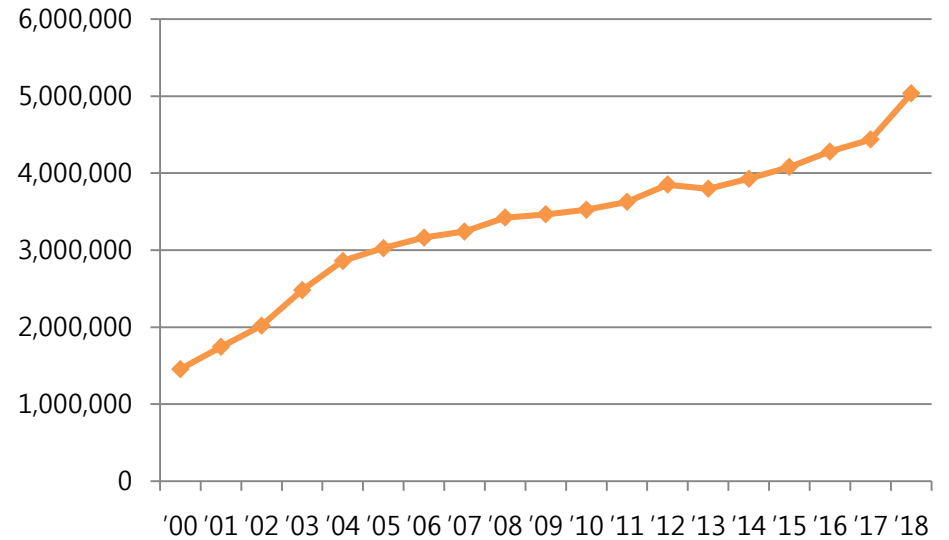
2. Financial issues

1. State of industrial accident insurance payroll

No. Of benefited workers



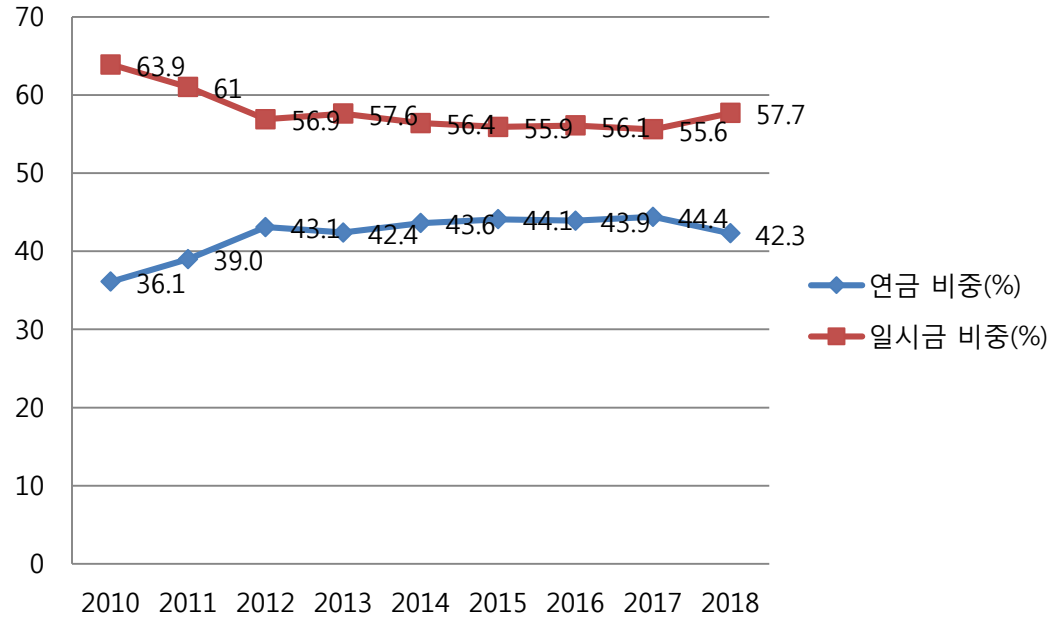
WCI Benefit Expenditures



	2000	2018
No. of benefited workers	114,401	297,239
WCI Benefit Expenditures (in KRW 100 mil)	1,456,266	5,033,901

2. Pension Increase

Trends of pension benefits



- The number of recipients keep increasing cumulatively, and the aging trend is evident.
- The proportion of pension benefits has been consistently increasing, and reached 42.3% in 2018.

3. Institutional Reforms (2018~Present)

- Introduction of Commuting Accidents Compensation System('18 .1.1.)
- Abolition of employer seal system when applying for WCI('18 .1.1.)
- Extension of the extinction prescription of long-term benefits from 3 years to 5 years('18.12.13.)
- Extension of the entitlement age of children for the survivor's annuities from 19 years to 25 years('18.12.13.)

4. The Financial System(1964~2008)

- 1964 : pay-as-you-go system(lump-sum benefits)
- 1970 : The introduction of Pension system
- 1993 : Partially-funded system
 - => The liability reserve was set as the sum of "6 years' amount of the benefit payments of the current year" and "a quarter of the expected benefit payments in the following year".
- 2008~ : The revised criterion for a liability reserve
 - => The liability reserve has been reduced to "the total amount of benefit payments in the previous year"

5. The problems of the current financial operation system

- Cumulative increase in pensioners
- Low birth rate and Aging population



- The current financial operation system causes an issue of fairness between the current and future generations.
- The motivation for better prevention of occupational accidents will go down.

3. How to Calculate Loss Reserve

1. Background

The research purposes

- To compare models for the estimation of loss reserves between a cash basis and an accrual basis
- To estimate the loss reserves of Korean Workers' Compensation Insurance, using the estimation method on an accrual basis

1. Background

(1) Methodological Background

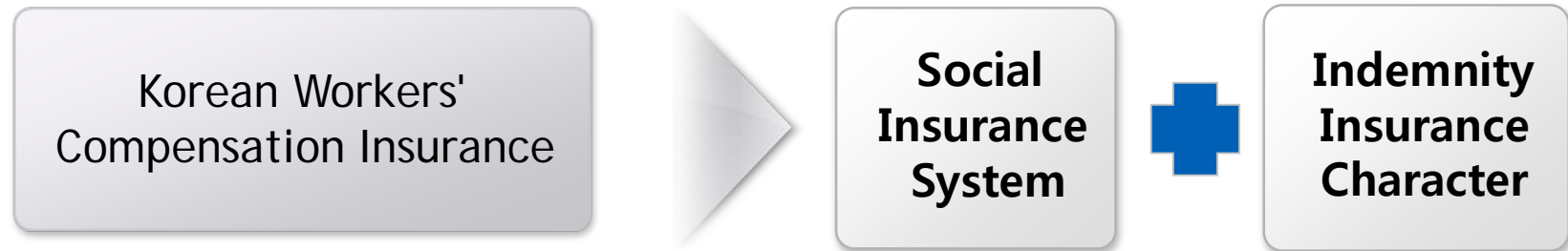
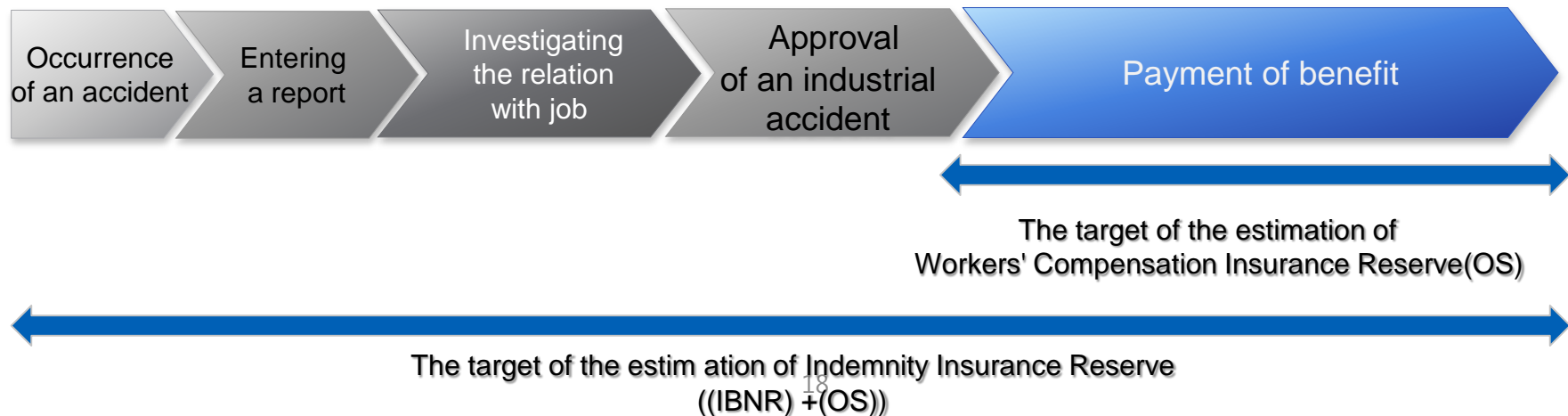


Fig. 1. The process of the payment

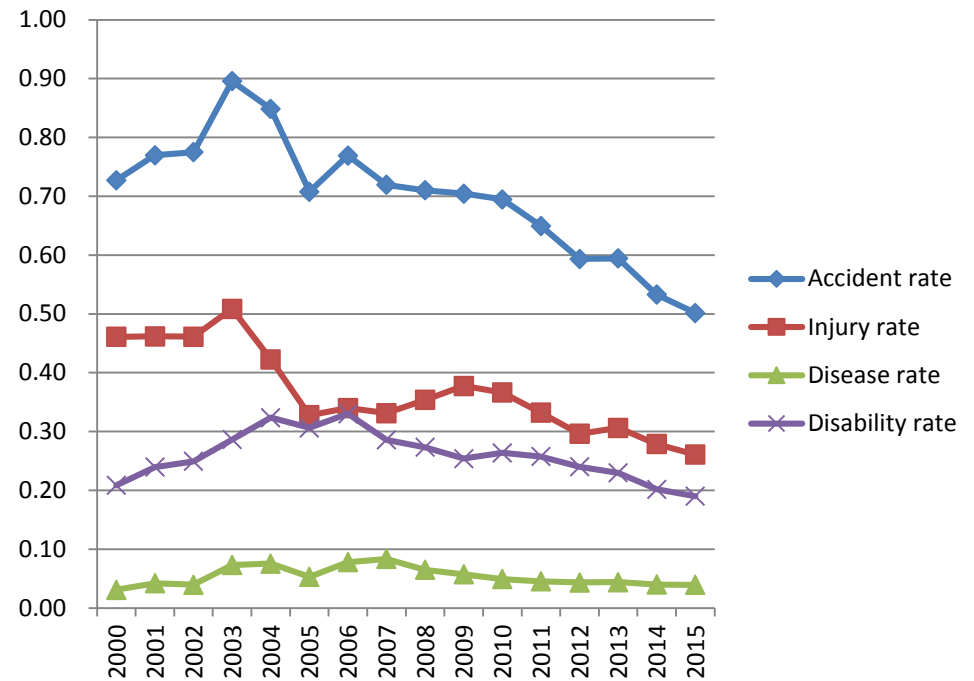


1. Background

Risk of underestimation without IBNR Losses

- Implementation of a Pension System
- The Aging Trend
- Operation of an Additional Medical Care System after the Completion of Recuperation
- Increase of Recipients with Job-Related Diseases who get medical care for a Long time

Fig. 2. The Trend of Accident rates



1. Background

(2) Social Background

- The introduction of accounting standards of IFRS4 in 2011, criteria for the recognition of debt changed from cash basis to accrual basis.
=> Government Employees Pension, Military pension

<National Accounting Standards>

Insurance Business

: "Insurance Business"
calculates debt on an
accrual basis

- => Automobile Insurance
- => Life Insurance

Social Insurance

: "Social Insurance"
calculates debt(**amount
of benefit payment for the
next year**) on a **cash basis**

- => Workers' Compensation
Insurance

1. Background

(3) Institutional Background

- The pension benefit shows the scale of about 42.3% as of 2018.
- The scale of the reserves accumulated now about three times of mandatory reserve regulations.
- But pay-as-you-go system causes an issue of unfairness between the present generation business owners and the future generation business owners.

2. Loss Reserve Models

(1) Loss reserve Model - on a cash basis

1. Estimation of the Future Population

- The number of Future Population
- The number of Economically Active Population
- The number of Workers to which WCI applies

2. Estimation of the Benefit Recipients

- The number of New Benefit Recipients
- The number of Continuous Benefit Recipients

3. Estimation of the Benefit Amount

- Reflecting the Growth rate of Wage or Inflation rate

2. Loss Reserve Models

(2) Loss reserve Model - on an accrual basis

1. IFRS4 Phase(2011)

- (1) Chain Ladder Method(Paid Loss Development Method)
- (2) Average Payment Method
- (3) Bornhuetter-Ferguson Method

2. IFRS17 Phase(2021)

- (1) Mack Model
- (2) SCLM Model(Stochastic Chain Ladder Method)
- (3) Bootstrap Mack's Model

2. Loss Reserve Models

Table 1. Comparison of Loss Reserve Models

	Cash Basis Model	Accrual Basis Model
Target of the Estimation	OS	IBNR + OS
Progress	Using 3 Step-Estimation (the future population => the future recipients => the future benefit)	Using Paid Loss Trend
Variable	Life table Economic Indicators	(Life table may be applied to the tail)
System	Pay-As-You-Go	Accumulative
Analysis Technique	One-Dimensional Analysis e	Two-Dimensional Analysis

3. Overseas Case

Table2. Comparison of Overseas Case

	Accounting standards	Methods
Canada / Australia	Accrual Basis	It includes IBNR in calculating the reserve fund of Workers' Compensation Insurance
United States	Accrual Basis	(1) Public insurance (2) Private insurance => The reserve fund is calculated including IBNR by accrual basis for both
Japan	Cash Basis Model	(1) Public insurance => Mixed Method · Short-term benefit follows the pay-as-you-go system · Long-term pension benefit follows the accumulative method

4. The Results of the Analysis

1. Data

- Medical care expenses were analyzed for data protection.
- When workers recuperate themselves for job-related injuries or diseases for more than four days, the medical care expenses are paid to medical institutions until they recover themselves.
- As for the period of recuperation, a majority of people on medical care benefits for less than six months and more than 10 years account for about 10% of those on medical care benefits.

=> Most of them are patients with pulmonary diseases that occurred while working in the mining industry like coal mining in the 1960s through the 1970s

4. The Results of the Analysis

2. Methodology

- The medical care expenses paid by the company from 1998 through 2015 were used and inverse-estimated from 1964 through 1997 when no data were built up.
- The life table of disability pensioners was used in the tail part.
- PLDM, BFM and CAPE COD M were used by on an accrual basis.

4. The Results of the Analysis

3. Results(1)

- As a result of the estimation with on a cash basis, about 780 billion won is needed, and about 13.3 trillion won, in that with on an accrual basis, which is a difference of 17 times.

	1	2	3	4	5
FYD-3	P11	P12	P13	P14	E15
FYD-2	P21	P22	P23	E24	E25
FYD-1	P31	P32	E33	E34	E35
FYD	P41	E42	E43	E44	E45

4. The Results of the Analysis

3. Results(2)

- The difference between the estimated value and the actual value on the cash basis and the accrual basis, the difference was 0.3% to 6% from the actual value on an accrual basis, and 12% to 16%.
- This shows that the estimation with on an accrual basis was more accurate.

Year	Actual Value (Medical Care)	Estimated Value (Accrual Basis)	Gap	Estimated Value (Cash Basis)	Gap
2013	7,233	7,674	6.1%	8,109	12.1%
2014	7,406	7,800	5.3%	8,572	15.7%
2015	7,833	7,858	0.3%	9,025	15.2%

4. The Results of the Analysis

3. Results(3)

- As for the difference between the estimated value and the actual value on the accrual models, the difference was 0.9%, followed by 6% in PLDM and 10% in Cape Cod M.
- This shows that BFM technique using progress tendency and loss ratio together is the most appropriate for the Korean Workers' Compensation Insurance.

4. The Results of the Analysis

Table 3. PLDM Results(1964~2015)

(million won)

Occurrence Year of the Accident	Paid Loss	Ultimate loss ratio	Ultimate losses	Indicated loss reserve
	(1)	(2)	(3) = (1) x (2)	(4) = (3) - (1)
2010	561,392	2.135	1,198,340	636,948
2011	525,794	2.198	1,155,886	630,092
2012	504,233	2.282	1,150,750	646,517
2013	505,475	2.409	1,217,751	712,276
2014	447,753	2.663	1,192,213	744,460
2015	249,378	4.773	1,190,227	940,849
Sum	15,150,697		28,455,315	13,304,618

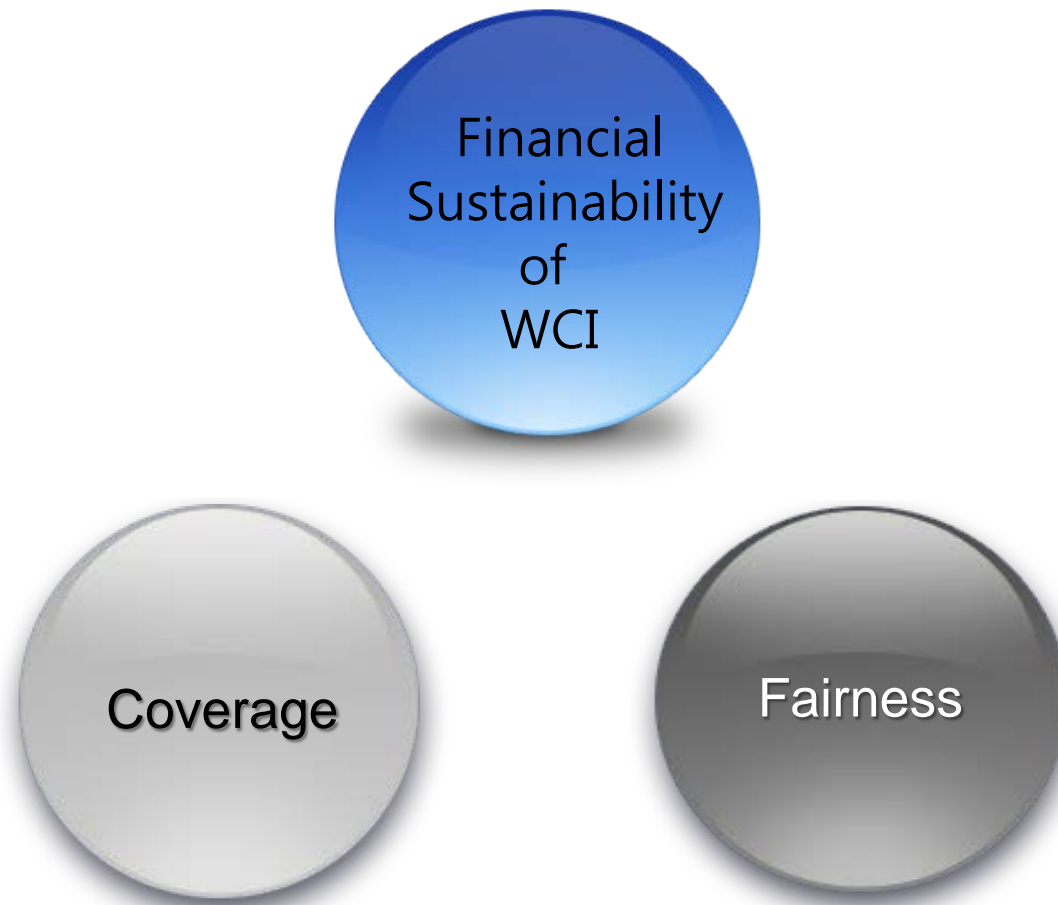
4. The Results of the Analysis

Table 4. Comparison of the Ultimate losses(1986~2015)

(million won)

Occurrence Year of the Accident	PLDM	BFM	Cape-cod
1986	376,073	307,104	313,284
1987	279,318	244,242	251,962
1988	319,603	275,114	283,931
1989	364,437	309,051	319,129
1990	412,164	350,315	362,609
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2010	1,198,340	1,259,167	1,368,331
2011	1,155,886	1,242,666	1,354,819
2012	1,150,750	1,255,945	1,373,548
2013	1,217,751	1,294,945	1,418,456
2014	1,192,213	1,337,166	1,476,313
2015	1,190,227	1,448,064	1,635,596
Sum	26,810,842	26,098,404	28,012,161

5. Implications



Thank You

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