The impact of the ageing population on companies' retirement benefit strategy in Japan

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Introduction

An ageing population is one of the biggest challenges facing developed countries in the 21st century. It has various negative effects on economic growth, such as labour shortages, increase in public expenditures and so on.

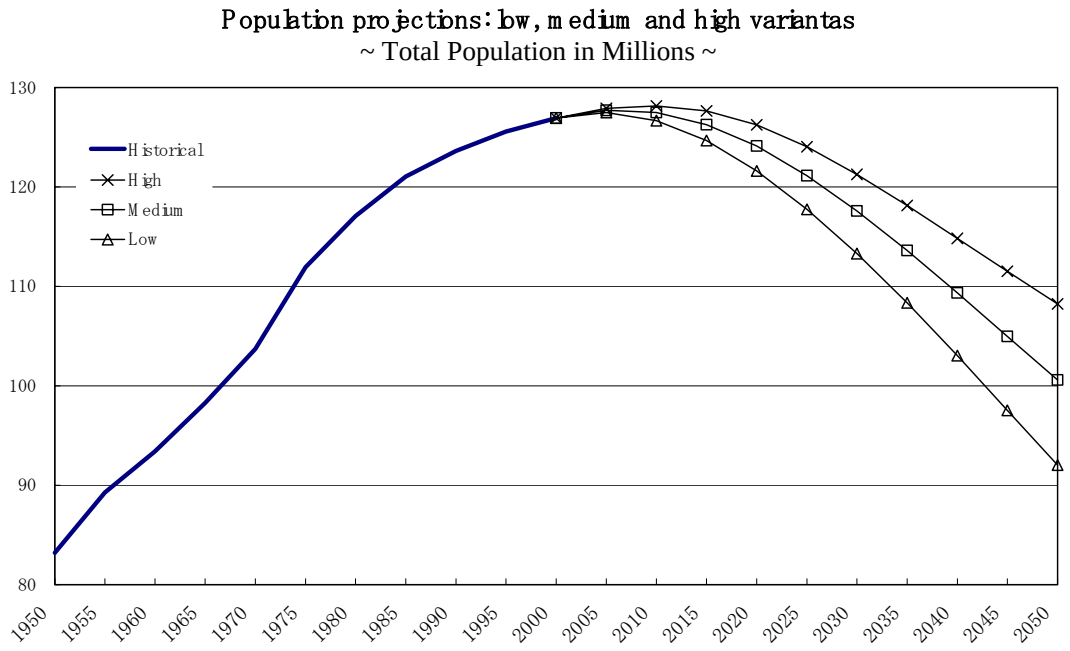
It can easily be seen that an ageing population will significantly affect social security pensions that are managed on a pay-as-you-go basis. However, the question arises - does the ageing population affect corporate pension plans? In most cases, corporate pension plans, which are qualified under the tax code or other laws, are funded. You might say that ageing would not significantly affect the funding of corporate pensions. The main purpose of this paper is to discuss the impact of the ageing population on corporate pensions, especially in terms of plan design, focusing on Japan

In Chapter 1, the demographic changes facing Japan are set out. The impact of ageing on retirement benefits plans is examined in Chapter 2. Potential supply-side barriers to employment of older workers are also discussed. Chapter 3 provides suggestions about plan design which will help to retain older workers or remove barriers for them. In conclusion, it is pointed out that a retirement benefit plan in which benefits are based on lump-sum benefits at termination, has excellent features with respect to removing barriers for older workers.

1. Ageing population in Japan

According to recent projections, Japan's total population is likely to peak in two years' time and is expected to decline substantially over the next half century (see Chart 1).

<Chart 1>



Source: the National Institute of Population and Social Security Research

The key factors behind these changes include low fertility rates and increasing life expectancy. Longer life expectancy results in a growing elderly population, while the low fertility rates are expected to lead to a steady fall in the population at younger ages.

The population projections produced by the National Institute of Population and Social Security Research use three different assumptions about future fertility rates, i.e. low variant (Total Fertility Rate = 1.10), medium variant (TFR = 1.39) and high variant (TFR = 1.63). Some key features of the projection are summarized in Table 1.

Table 1: Summary of the population projections

		Medium Variant	Low Variant	High Variant
Fertility Assumption (Total Fertility Rate)		**1.39**	**1.10**	**1.63**
Total Population				(in thousand)
	2000	126,926	126,926	126,926
	Peak	127,741 in 2006	127,483 in 2004	128,151 in 2008
	2025	121,136	117,755	124,044
	2050	100,593	92,031	108,246
Population aged 65 or over				(in thousand)
	2000	21,926	21,926	21,926
	2025	34,726	34,726	34,726
	2050	35,863	35,863	35,863
Working age (15 - 64) population				(in thousand)
	2000	86,219	86,219	86,219
	2025	72,325	71,529	72,993
	2050	53,889	48,683	58,375
Aged Population Ratio (65 or over)				
	2000	17.3%	17.3%	17.3%
	2025	28.7%	29.5%	28.0%
	2050	35.7%	39.0%	33.1%
Old-age dependency Ratio				
	2000	25.4%	25.4%	25.4%
	2025	48.0%	48.5%	47.6%
	2050	66.5%	73.7%	61.4%

One of the commonly used indicators of the economic burden resulting from an ageing population is the old-age dependency ratio, i.e. the ratio of the population aged 65 and over to the "working-age" population. Although the definition of the working-age population might vary, we have adopted a traditional definition that the working-age population is the population aged 15 to 64. The old-age dependency ratio of Japan is currently 22.5%. It is projected to increase to 48% in 2025 and 67% in 2050 according to the medium variant projection. In the low variant scenario, the old-age dependency ratio is projected to increase to 74% in 2050.

This means that three working age people will have to support more than two aged people in 2050. Japan will get a gold medal in the global race to an aged society. However, this gold medal will create a severe strain on public finances. A recent OECD report estimated that total public expenditures associated with ageing were expected to rise by 3% of GDP over the next five decades. The main component of this increase will be the rise in expenditure on health care and long-term care, but expenditures on old-age pensions will also increase.

In order to cope with the increase in the public expenditure, it will be necessary to have either a tax/contribution increase or a decrease in benefits. However, older people will have relatively high political power in terms of votes. This could make it more difficult to adjust public systems in the future.

The demographic changes will have a negative impact on the labour force. If the rate of participation in the labour force does not change, the labour force will fall significantly as the working-age population declines. In order to moderate the labour shortage, it will be necessary to increase the rate of participation of women and older people in the labour force.

2. Impact of ageing on retirement benefit plans

1) Impact on funding

In general, an ageing population apparently affects the social security pension which is typically managed on a pay-as-you-go basis. Let us introduce a simplified two generation model with the following notation.

$\mathbf{N_t}$: number of tth generation
$\mathbf{y_t}$: earning per head of tth generation
$\mathbf{c_t}$: contribution per head of tth generation
$\boldsymbol{\alpha}$: replacement ratio (or benefit rate)
n: demographic change
r: return on assets
g: growth rate

On the pay-as-you-go basis, the benefits for the $(t+1)^{th}$ generation should be financed by the contributions from the tth generation.

$$\mathbf{N_{t+1} \cdot c_{t+1} \cdot y_{t+1} = N_t \cdot \alpha \cdot y_t,}$$
where $\mathbf{N_{t+1} = N_t \cdot (1 + n)}$ **and** $\mathbf{y_{t+1} = y_t \cdot (1 + g)}$

This gives;

$$\mathbf{c_{t+1} = \alpha / \{(1 + n) \cdot (1 + g)\}}$$

Here, n is negative when the working-age population declines. You can see from the equation that contributions may increase as the working-age population falls relative to the older population.

The latest pension reform in Japan has introduced a new measure to adjust the benefit level as the population ages, in order to cope with the burden from the ageing.

On the other hand, the impact of ageing on the funding of corporate pensions is limited. Applying the same model, the following equation is given.

$$\mathbf{N_t \cdot c_t \cdot y_t \cdot (1 + r) = N_t \cdot \alpha \cdot y_t}$$

This gives;

$$\mathbf{c_t = \alpha / (1 + r)}$$

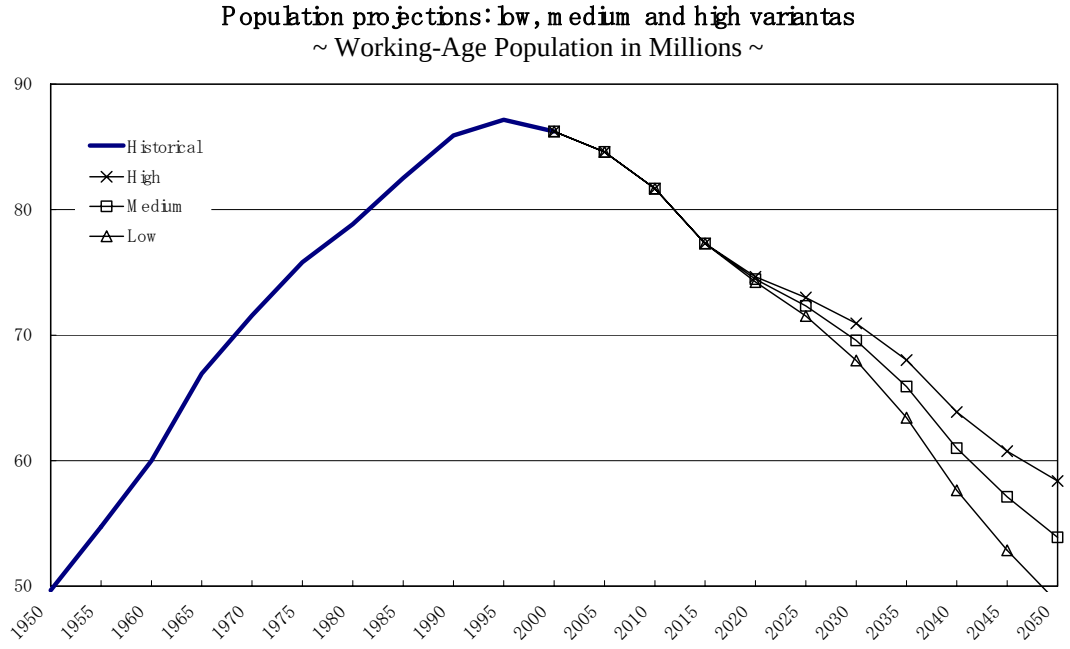
The contributions are affected by the market but not by ageing. Of course, the increase of life expectancy could affect the contributions through the longer duration of annuity payments. However, it is a question of your funding policy whether you take account in advance the future increase of life expectancy or not.

2) Impact on plan design

An ageing population does not affect the funding of corporate pensions as much as the financing of the social security pension. However, ageing could have a significant impact on labour force supply and consequently on companies' human resources strategy.

The decline in the working-age population has already started and we will experience a significant fall in the next half century (see Chart 2). Consequently, assuming that the labour force participation rate does not change, the labour force will decrease rapidly and companies might encounter difficulty in maintaining the necessary labour force.

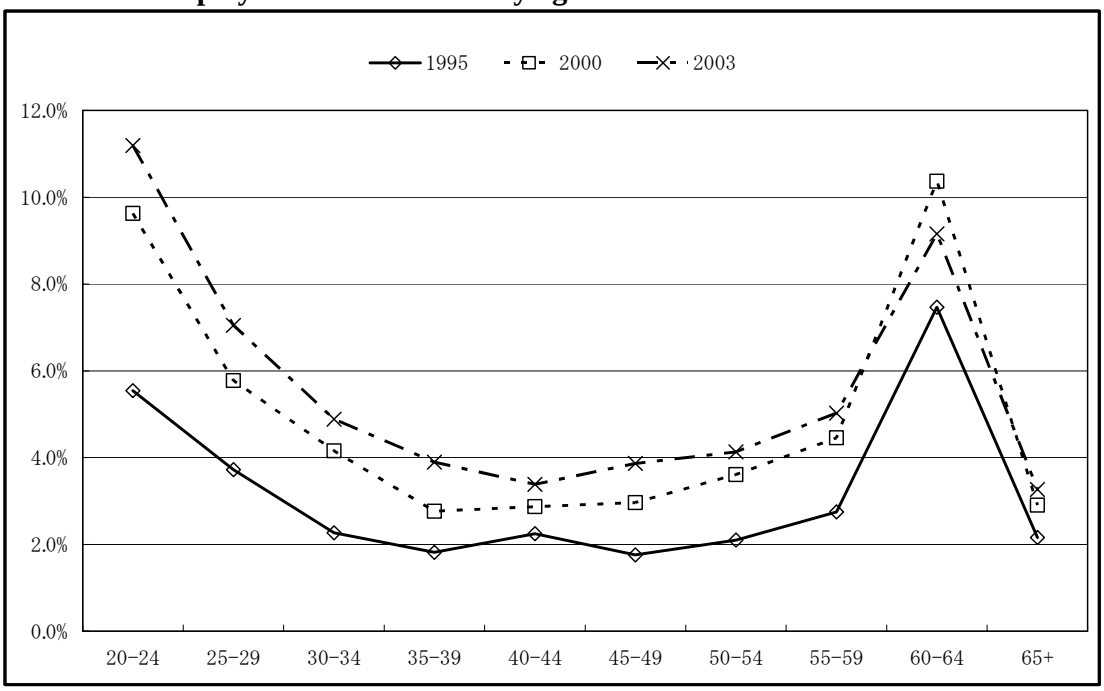
<Chart 2>



Source: the National Institute of Population and Social Security Research

The current situation of the labour market is not favourable for older workers. The unemployment rate for men aged 60-64 was 9.2% in 2003, whereas the rate for prime age men (25-54) was 4.6% (see Chart 3). We can observe low retention rates in the labour market for older workers. In Japan there are several factors in employment practices which lead to low retention rates for older people.

Chart 4: Unemployment rates of men by age



Source: Labour Force Survey

A. Mandatory Retirement Age

Most Japanese companies set a mandatory retirement age in agreement with employees. This is the age at which workers are expected to resign from their current post.

For employers without a mandatory retirement age, it is legally possible, but practically impossible, to remove elderly, and therefore costly, workers. For employees, there has been a guarantee of employment until the mandatory retirement age.

In 2003, 90% of companies had a uniform mandatory retirement age (Table 2). 89% of these companies set their retirement age at 60.

Table 2: Companies with a Mandatory Retirement System

Number of Regular Employees	With M.R.A.	With Uniform MRA	59 and Under	60	61-64	65	66 and over
Total	92.2	89.9	1.1	89.2	2.7	6.8	0.1
5000+	100.0	95.0	-	98.4	1.3	0.3	-
1000-4999	99.8	97.6	-	97.2	2.0	0.9	-
300-999	99.4	96.4	0.2	93.3	3.1	3.1	0.4
100-299	98.0	95.6	0.0	90.8	3.5	5.7	0.0
30-99	89.6	87.4	1.6	88.0	2.4	7.8	0.1

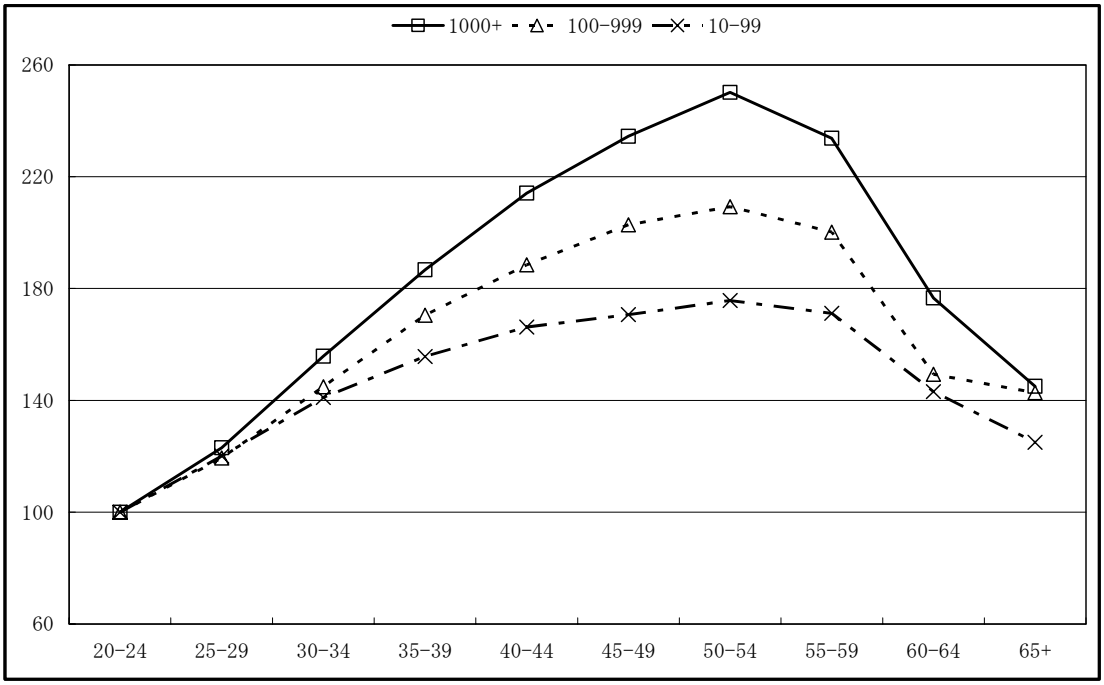
Source: Ministry of Health, Labour and Welfare, Survey on Employment Management 2003

B. Seniority Salaries

In most companies, salaries tend to rise by age. The Chart 4 shows the age-earnings profile for men by company size in 2003. This could be the result of an implicit

and traditional contract between the employer and the employee such that salaries are determined based on seniority.

Chart 4: Age-earnings profile for men ~ Earnings of 20-24 year olds = 100 ~



Source: Ministry of Health, Labour and Welfare, Basic Survey on Wage Structure 2003

Of course, many companies have been moving toward a salary system based on "pay-for-performance" or "pay-for-job" concepts. However, observing actual statistics of salaries by age, there are still strong correlations between salary and years of age/service.

In the face of a labour force shortage, how will companies change their systems in order to retain the elderly workers? They might think about shifting the mandatory retirement age to 65 or so. The new legislation will urge companies to shift the mandatory retirement age or establish a "continuous employment system" after the mandatory retirement age. If they shift the mandatory retirement age, they will want to change their seniority salaries more rapidly. In the seniority salaries system, without a mandatory retirement age, salaries will eventually rise above a worker's productivity.

Retirement benefit plans in Japan are designed on the basis of these employment practices, i.e. a mandatory age of retirement and seniority salary systems. If companies start to change their employment practices, they may have to change their retirement benefit plans as well. Thus, the ageing population will have an effect on plan design.

3. Benefit designs which provide incentives for the elderly to stay in work

The traditional retirement benefit plans in Japan provide lump-sum benefits with an option of annuity benefits. The main benefits are lump-sum benefits; the annuity benefits are defined as actuarially equivalent to lump-sum benefits. In the case of plans with such features, a different retirement or termination age does not affect the values of benefits attributed to a year of service, assuming that the benefit formula is flat. This is a very different perspective from a retirement benefit plan where the main benefits are annuity benefits.

Let us investigate this issue further using the following notation.

$\mathbf{a_x}$: Present value of annuity payment of 1 for life from age x
$\mathbf{A_t}$: Annuity benefit if an employee terminates with t years of service
$\mathbf{L_t}$: Lump-sum benefit if an employee terminates with t years of service
$\mathbf{A_r}$, $\mathbf{L_r}$: Annuity benefit at retirement
${}_t\mathbf{A_r}$, ${}_t\mathbf{L_r}$: Accrued benefit at **t**
$\mathbf{W_x}$: Salary at **t** (age **x**)
$\mathbf{K_A}$: annuity benefit rate (flat rate)
$\mathbf{K_L}$: lump-sum benefit rate (flat rate)
i, **v**: interest rate, **1/(1+i)**
g: salary increase rate (assuming that **i=g**)

We will assume that an employee terminates with **t** years of service and at age **x**.

- **Lump-sum base formula:**

Lump-sum benefit at t is $\mathbf{L_t = K_L \bullet t \bullet W_x}$,
hence, annuity benefits should be $\mathbf{A_t = L_t / a_x = L_t / (v^{(r-x)} \bullet a_r)}$

The present value of $\mathbf{A_t}$ is $\mathbf{PV(A_t) = A_t \bullet v^{(r-x)} \bullet a_r = L_t}$

The present value of the annuity benefit is always equal to the lump-sum benefit.

Lump-sum benefit at **r** is $\mathbf{L_r = K_L \bullet r \bullet W_r}$,
hence, annuity benefit is $\mathbf{A_r = L_r / a_r}$.

Accrued benefit of $\mathbf{A_r}$ at **t** is ${}_t\mathbf{A_r = K_L \bullet t \bullet W_r / a_r = K_L \bullet t \bullet W_x \bullet (W_r / W_x) / a_r}$.

Here $\mathbf{K_L \bullet t \bullet W_x}$ is equal to $\mathbf{L_t}$ and $\mathbf{W_r / W_x = (1 + g)^{(r-x)} = (1 + i)^{(r-x)}}$
so, ${}_t\mathbf{A_r = L_t \bullet (1 + i)^{(r-x)} / a_r}$.

The present value of ${}_t\mathbf{A_r}$ is $\mathbf{PV({}_tA_r) = {}_tA_r \bullet v^{(r-x)} \bullet a_r = L_t}$.

It can be seen that, with the lump-sum base formula, the present value of accrued benefits at t is equal to the lump-sum benefit at t. An employee can receive benefits with the same value regardless of the termination age.

- **Annuity base formula:**

Annuity benefits should be $\mathbf{A_t = K_A \bullet t \bullet W_x}$.

The present value of $\mathbf{A_t}$ is $\mathbf{PV(A_t) = A_t \bullet v^{(r-x)} \bullet a_r}$.

Annuity benefit is $\mathbf{A_r = K_A \bullet r \bullet W_r}$.

Accrued benefit of $\mathbf{A_r}$ at **t** is ${}_t\mathbf{A_r = K_A \bullet t \bullet W_r = K_A \bullet t \bullet W_x \bullet (W_r / W_x)}$.

Here $\mathbf{K_A \bullet t \bullet W_x}$ is equal to $\mathbf{A_t}$ and $\mathbf{W_r / W_x = (1 + g)^{(r-x)}}$,
so, ${}_t\mathbf{A_r = A_t \bullet (1 + g)^{(r-x)}}$.

The present value of ${}_t\mathbf{A_r}$ is $\mathbf{PV({}_tA_r) = {}_tA_r \bullet v^{(r-x)} \bullet a_r = A_t \bullet v^{(r-x)} \bullet a_r \bullet (1 + g)^{(r-x)}}$.

Comparing $\mathbf{PV({}_tA_r)}$ with $\mathbf{PV(A_t)}$, the value of benefits decreases by $\mathbf{1 / (1+g)^{(r-x)}}$, if an employee terminates before retirement age.

Thus a plan with a "lump-sum based formula" can provide "age-free" benefits. These analyses are based on assumptions including 1) the benefit formula is flat and 2) future salary increase is equal to the discount rate. I think that we can say that a plan with

a "lump-sum based formula" can provide more "age-free" benefits than a plan with "annuity based formula".

You may ask whether such a plan can facilitate an ordinary pattern of retirement for an employer. To provide an ordinary pattern of retirement is an important objective of a retirement benefit plan. However, in Japan, we have the mandatory retirement age system. Employers do not care much about this function of retirement benefit plans.

The issue of Japanese traditional retirement benefit plans facing ageing is that a typical benefit curve is an S-bend. Benefit increases for a younger worker and for an older worker are much smaller than benefit increases for a middle-age worker with 10 to 25 years of service. Many companies do not give any benefit increase after a certain age, say 55 years, which was a previous mandatory retirement age in many cases. If employers intend to retain older workers, such retirement plans could get in the way.

One solution to this issue is a cash-balance (CB) type plan. For a CB plan, a hypothetical individual account is set up for each participant, a pay-credit will be accumulated in the account each month/year and an interest credit will be granted according to the account balance. The benefit amount should be determined by the account balance at termination. If pay credits are determined uniformly (regardless of age or years of service), and interest credits are determined reasonably, a CB plan can provide a more "age-free" benefit than any other plans.

4. Conclusion

Japanese society will face, or is already facing, an ageing population. Employers have to prepare for a future decline in the labour force and an ageing of the labour force. They may have to change their HR strategy in order to retain older workers.

Traditional Japanese retirement benefit plans, which typically have a "lump-sum based formula", have good features in principle for the retention of older workers. If they change the benefit curves into flatter ones, the existing plans will not obstruct later retirement.

A cash-balance type plan, which is allowed by the new defined corporate pension law, could be a solution for employers who want to retain older workers. Furthermore, a CB type plan does not conflict with a salary system based on a "pay-for-performance" or "pay-for-job" concept.

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