

Automatic Balancing Mechanisms

Preliminary draft

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Abstract

Greater than anticipated improvements in longevity and decline of fertility together with slowdown of economic growth have undermined the sustainability of the social security pension schemes and quite a few countries have instituted reforms to restore financial equilibrium under such environmental changes. In doing so, since the late 1990's, several countries introduced a mechanism that automatically restores financial balance in the schemes without congressional or parliamentary decision making or statutory amendments. The mechanism is built into the scheme framework. Its introduction may be attributable to technical reasons in some cases or to political reasons in other cases. Thus the mechanisms are different from each other, depending on the reasons for introduction. Analysis of the features of such mechanisms will be of help not only to countries that are considering their introduction, but also to countries that have already introduced them, in improving their framework. In this paper we take up examples of Canada, Sweden, Germany and Japan and summarize and compare their features.

Keywords: automatic balancing mechanism, sustainability factor, modifier, notional defined-contribution scheme (NDC scheme)

1. Introduction

Sustainability is one of the focal points in the management of social security pension schemes. However, the socio-economic environment – such as the demographic structure, price inflation or rates of salary increase – incessantly changes and a decision taken at one time does not necessarily remain effective after some time has passed. These changes can destroy the financial equilibrium that was once attained by scheme reforms and again threaten scheme sustainability. Out of such experiences several countries came to install a mechanism in their social security pension schemes that automatically restores the financial equilibrium and keeps the schemes sustainable. Such a mechanism is called an automatic balancing mechanism (ABM).

Examples of countries that have installed an ABM are Canada, Sweden, Germany and Japan. The mechanisms in these countries function as a financial stabilizer that is supposed, automatically, to restore the financial equilibrium when changes the socio-economic environment have caused financial imbalance in the schemes. By automatically, we mean that the mechanism is activated in the event of parliamentary inaction or without parliamentary decision making.

However, if we closely look at them, the framework of the mechanism varies from country to country. In the case of Canada the contribution rate is not fixed and can be raised when the ABM is activated. In other cases the contribution rate or the contribution programme is fixed and the benefit level is automatically reduced by the ABM. The Swedish approach requires the scheme to convert the benefit design into a Notional Defined-contribution plan (NDC) while German and Japanese approaches do not require such a conversion.

As a result each ABM has its own characteristics, and whether it is suitable to a country or not depends on the context in the country that necessitates the reform and the introduction of an ABM. The paper explores and compares the merits or advantages and the weaknesses or disadvantages of the ABMs of these countries.

2. Canada

(1) Overview of the ABM

In Canada, actuarial review of the Canada Pension Plan (CPP) is carried out every three years. The Chief Actuary reports the minimum contribution rate that will sustain the plan, together with other analysis of the financial state of the CPP, to the federal and provincial Ministers of Finance – for them to make recommendations as to whether the benefits and/or contribution rate should be changed.

The minimum contribution rate is the sum of steady-state and full funding rates. The

steady-state contribution rate means the smallest contribution rate by which the ratio of assets to expenditures stabilizes over time. The full funding contribution rate applies to any new benefits which, by law, must be fully funded.

If the legislated contribution rate is lower than the minimum contribution rate, and the federal and provincial finance ministers cannot reach an agreement to increase or maintain the legislated rate, then the contribution rate is increased over three years by a half of the difference between the minimum contribution rate and the legislated contribution rate, and the benefits are frozen until the next actuarial review that is to take place in three years' time. Freezing the benefits means freezing indexation. On the next actuarial review the minimum contribution rate is calculated based on the updated assumptions and the same process is repeated. This framework is called the "insufficient rates provisions".

In the case of the CPP the insufficient rates provisions serve as the ABM. If the legislated contribution rate is lower than the minimum contribution rate and if no legislative action is taken, the insufficient rates provisions are applied and the contribution rate is increased by a half of the excess of the minimum contribution rate over the legislated rate. This clearly contributes to keep the financial conditions of the CPP in a much better state than the case where there are no insufficient rates provisions and the contribution rate is left unchanged. Furthermore the benefits are not indexed at all (to price nor salary increases). This also contributes to keeping the financial conditions of the CPP in a healthier state. If the freezing of benefits has the effect of reducing the contribution rate by a half of the excess rate in three years' time, then the result is almost equal to increasing the contribution rate to the minimum contribution rate and the plan returns to a sustainable state.

(2) Advantages

One of the advantages of the ABM of the CPP in the form of the insufficient rates provisions is that it keeps the CPP in a better financial condition than without them. In some cases it has the effects of keeping the CCP on the same financially robust basis as increasing the contribution rate to the minimum contribution rate. It also makes policy makers conscious of intergenerational fairness. They would face the fact that a contribution rate less than the minimum contribution rate would likely impose heavier burdens on future generations ultimately.

Another advantage is that there is no need to alter the benefit design.

A final advantage is that the "pain" of returning to sustainability is shared between workers (though higher contributions) and retirees (through slightly lower benefits).

(3) Disadvantages

The insufficient rates provisions are subject to the decisions made by the federal and provincial finance ministers. When the finance ministers reach agreement, the insufficient rates

provisions are not activated, so it is unlikely that they will be activated. Certainly, it would be rare that they are activated several times in a row, but if this should happen, the contribution rate might go up beyond the sustainable level or the benefit level might become inadequate. This could be a disadvantage of the insufficient rates provisions. However, in reality, policy makers should be expected to take on the issue and decide countermeasures of some sort, so the situations mentioned above will extremely rare if non-existent.

Another disadvantage might be that, even if the insufficient rates provisions are activated, the result does not guarantee that the financial conditions of the CPP are in steady-state funding although the financial conditions of the scheme is still much better than the case where such insufficient rates provisions are not activated and the scheme is left as before. For example, if there are no salary increases for the next three years, the contribution rate after activating the insufficient rates provisions does not keep the ratio of assets to expenditures stable.

3. Sweden

(1) Overview of the ABM

In Sweden the social security pension scheme was restructured in the 1990's and currently only provides old-age pension benefits. The disability and survivors' pensions are provided from general expenditure.

The old-age benefits are provided through what is called the notional defined-contribution benefit design (NDC) together with the defined-contribution benefit design (DC). The active participants in the social security pension scheme pay contributions at the rate of 16% of their income to the NDC part and at the rate of 2.5% to the DC part.

The plan design of the NDC part is as follows. Each participant has his/her own account in which his/her contribution amount is recorded. Actual contributions are not saved or accumulated in the account but used to pay the benefits to the beneficiaries. Interest is also given to the recorded amount at the same rate as the average salary increase rate.

The old-age benefit amount of the NDC part is calculated by dividing the sum of principal and interest in the account by the present value of life annuity at the age at which the beneficiary starts to receive the benefits. Participants may start receiving the old-age benefits at any age no less than 61. The present value of life annuity is calculated based on the latest mortality table with the interest rate of 1.6%. The benefit amount is indexed to the salary increase rate (less the 1.6% real interest rate).

The ABM in Sweden is included in the NDC part. It starts with calculating the balance ratio every year. The balance ratio is the ratio of the sum of the amount of buffer funds (accumulated

from past cash flow surpluses) and the amount of the contribution assets to the present value of the benefits that have so far accrued corresponding to the past period of the beneficiaries, the active participants and the terminated participants. The amount of the contribution assets is defined to be the amount of annual revenue of contributions multiplied by the turnover duration. The turnover duration is the difference between the average age of beneficiaries weighted by the amount of benefit and the average age of active participants weighted by the salary.

If the balance ratio is no less than 1, there is no action. If the balance ratio is less than 1, the interest rate on individual account is reduced by $1 - (\text{the balance ratio})$. Likewise the indexation for beneficiaries is also reduced by the same rate. This action is the ABM in Sweden.

(2) Advantages

One of the advantages of the Swedish ABM is that it makes the scheme design as simple as possible. For the participants it looks no different from personal savings. It also implies that the ABM plays a key role in solving the problem of two pensions when the scheme is changed from pay-as-you-go scheme to funded scheme. In such a case the active participants have to pay contributions for the beneficiaries as well as for themselves.

Another advantage is that it only uses the experienced data to activate the ABM and does not use projections which quite often entail political discussions with respect to assumptions. This may be a characteristic rather than an advantage.

(3) Disadvantages

Although the Swedish ABM was an epoch-making invention to break through the problem of two pensions when converting the PAYGO scheme into a scheme like a funded one, there are some disadvantages as well.

First the benefit design is restricted to the NDC if we want to introduce a Swedish-type ABM into the social security pension scheme. If the current scheme plays an income redistributive role and we want it to continue to do so, the current scheme cannot be converted into the NDC even if the minimum guarantee pension is in place. The NDC system has, in principle, no income redistributive function and, for those whose pension is not relevant to the minimum guarantee pension, the higher the career average salary is, the more increase or the less decrease the pension amount will have on conversion from the PAYGO scheme to an NDC scheme. From the perspective that values income redistribution such a reform is not acceptable.

Second a Swedish type of ABM cannot be defined in a scheme that has a benefit design different from the NDC system. A Swedish ABM heavily depends on the equation that the present value of the benefits that have accrued so far corresponding to the past period is equal to the annual revenue of the last year multiplied by the turnover duration. It only holds for the NDC scheme with

stationary population. If the benefit design is different from the NDC, the turnover duration cannot be defined and the equation does not hold. This also implies the fact that a Swedish ABM requires the conversion of scheme design into the NDC. That is too restrictive.

Third with the working population decreasing like Japan a Swedish ABM can be too optimistic because, when the balance ratio is calculated, it is assumed that the annual revenue of contributions is constant while the actual revenue would decrease. It would result in consecutive activation of the ABM for a very long time. This may not be seen as reasonable and lead to instability. In other words it is not an effective way to restore financial equilibrium under the rapidly ageing demographic environment.

Fourth there is no guarantee that the scheme is in financial equilibrium in traditional sense even if the balance ratio is no less than 1. It should be checked by the actuarial projections.,

4. Germany

(1) Overview of the ABM

The benefit formula of German social security pension scheme is based on what they call point system. Under the point system each of the active participants is given every year a point that is equal to the ratio of his/her annual income to the average income of the active participants. When awarding him/her the right to the old-age pension benefit, his/her points earned in the past period are summed up and the amount of the pension benefit is calculated as the multiplication of the sum of the earned points and the pension unit value. The pension unit value is decided every year according to the increase rate of average salary. In other words the pension benefit amount is indexed to salary increase.

The 2004 reform introduced another factor called sustainability factor to decide the pension unit value. The factor is defined as follows:

$$SF_t = 1 + \alpha \left(1 - \frac{M_{t-1}}{M_{t-2}}\right)$$

where SF_t is the sustainability factor of year t , α is a constant satisfying $0 \leq \alpha \leq 1$ and M_t is the ratio of the number of beneficiaries to the number of the sum of the number of active participants in the year t and the number of unemployed persons in the year t .

After the 2004 reform the pension unit value is indexed to the increase rate of salary multiplied by the sustainability factor SF_t .

The sustainability factor plays an ABM role in the German social security pension scheme. It can be seen as follows. The pay-as-you-go contribution rate for a year, which is the ratio of the total expenditure of the year to the total pensionable salary of the year, can be written as the

replacement rate of the pension benefit multiplied by the ratio of the number of beneficiaries to the sum of the number of active participants and the number of unemployed persons, namely M_t .

$$\begin{aligned} \text{(pay - as - you - go contribution rate)} &= \frac{\text{(total expenditure)}}{\text{(total pensionable salary)}} \\ &= \frac{\text{(average amount of benefit)} \times \text{(number of beneficiaries)}}{\text{(average pensionable salary)} \times \{ \text{(number of active participants)} + \text{(number of the unemployed)} \}} \\ &= \text{(replacement rate)} \times M_t \end{aligned}$$

Here the replacement rate of the pension benefit means the ratio of the average amount of benefits to the average pensionable salary. The principle of indexation is to keep the replacement rate constant as both the average amount of benefit and average salary increase or decrease by the same rate. So the change of the pay-as-you-go contribution rate is attributable to the change of M_t . Therefore if we want to keep the pay-as-you-go contribution rate constant, we have to adjust the indexation by $\frac{M_t}{M_{t-1}}$. This is the basic idea of the German sustainability factor. If we call M_t the maturity rate of

the scheme, the basic idea of the German ABM is to reduce the indexation by the increase rate of the maturity rate so that the pay-as-you-go contribution rate can be kept constant.

The German sustainability factor also contains the constant factor α . It represents the degree to which the increase of the maturity rate is reflected in reducing the indexation. If $\alpha = 1$, it means that the increase rate of the maturity rate is totally reflected in reducing the indexation. Actual choice of the German social Security pension scheme was to reflect a quarter of the increase rate of the maturity rate, namely $\alpha = 0.25$.

In the German system the upper limit of the contribution rate is fixed. It is 20.0% until 2020 and 22.0% after 2020. In this sense there is some room for the contribution rate to slightly increase and the constant factor α has been introduced to mitigate the reduction.

In conclusion the German ABM is to restore financial equilibrium by reducing the indexation bit by bit on the basis of the increase rate of the maturity rate.

(2) Advantages

One of the advantages of the German ABM is that, by setting α properly, the certainty that the mechanism restores the financial equilibrium is very high. For example if $\alpha = 1$, it certainly keeps the contribution rate at the current level.

Another advantage is that it is applicable to any benefit design. It does not require the scheme to change the benefit design.

Furthermore it can assure the active participants that the contribution level will not change so much in the future.

(3) Disadvantages

One of the disadvantages of the German sustainability factor is that it may give rise to anxieties that the benefit level might infinitely be reduced and eventually lose its adequacy. As the population ageing incessantly continues, the sustainability factor may reduce the benefit level every year and after a while the beneficiaries as well as the active participants might come to have the anxieties.

Another disadvantage might be that, as $\alpha = 0.25$ and the sustainability factor only reflects a quarter of the change in the maturity rate of the scheme, it might not restore financial equilibrium even when the pension scheme reaches a state where the maturity rate hardly increases or even decreases. If such a situation is foreseen, a big review of the scheme would be necessary.

5. Japan

(1) Overview of the ABM

The normal indexation of the social security pension schemes in Japan is based on the increase rate of average disposable income of the active population until the age of 65 and on the increase rate of the Consumer's Price Index (CPI) after the age of 65.

It is stipulated in the law in Japan that the social security pension schemes must carry out actuarial valuation at least once every five years and, as the population have continuously aged more than anticipated for the last three decades, it repeated reforms several times since the 1980's. This led to fruitless political battles between the government parties and the opposition parties. In 2004, in order to get rid of such fruitless political battles, the government went through a reform that fixed the future contribution programme and introduced what is called the modified indexation.

The contribution programme was fixed to erase the anxiety of younger generations that the contribution rate might be endlessly raised.

The modified indexation means the indexation based on the index that is equal to the normal index minus the modifier. Here the modifier means the sum of the decrease rate of the number of active participants in the social security pension schemes¹ and the increase rate of unisex life expectancy at the age of 65. The latter is fixed at 0.3% to avoid fluctuations due to contagious diseases like influenza. These are the factors that undermine the financial strength of the schemes.

The modified indexation is activated if the financial projections of the social security pension schemes for the next 95 years under the normal indexation show financial imbalance. Furthermore there are some conditions for the activation. If the CPI increase rate or the salary increase rate is negative, it is not activated. If the CPI increase rate or the salary increase rate is

¹ If it is increasing, it is set to be zero.

positive but less than the modifier, the modified index is replaced by zero. The Japanese economy has been deflationary since the introduction of the modified indexation in 2004 and it has not been activated yet as of the end of March 2013.

(2) Similarity to German sustainability factor

The German sustainability factor seems quite different from the Japanese modified indexation at a first glance, but they have commonalities.

The German sustainability factor modifies the normal indexation based on the salary increase. On this point it is similar to the Japanese modifier. Furthermore it modifies the normal indexation by $\alpha\left(\frac{M_{t-1}}{M_{t-2}} - 1\right)$ which can be written in the following way:

$$\begin{aligned} \alpha\left(\frac{M_{t-1}}{M_{t-2}} - 1\right) &= \alpha\left\{\frac{1 + (\text{increase rate of the number of beneficiaries})}{1 + (\text{increase rate of active participants and the unemployed})} - 1\right\} \\ &= \alpha\{(\text{increase rate of the newly awarded persons}) + (\text{increase rate of life expectancy}) \\ &\quad + (\text{decrease rate of active participants and the unemployed})\} \end{aligned}$$

Therefore both German sustainability factor and the Japanese modifier have common factors of increase rate of life expectancy at the pensionable age and decrease rate of the active participants and the unemployed. It is an interesting coincidence.

(3) Advantages

As we have seen in the previous section, the Japanese modifier is very similar to the German sustainability factor. So the advantages and the disadvantages of the Japanese modified indexation are quite similar to those of the German case.

One of the advantages of the Japanese modified indexation is that it is applicable to any scheme.

Another advantage is that it can erase the anxiety of active participants, especially younger ones that the contribution rate might endlessly go up.

(4) Disadvantages

One of the disadvantages of Japanese modified indexation is that it may give rise to anxieties that the benefit level might be endlessly reduced. In order to prevent it from happening, the Japanese ABM installed the benefit floor provisions. It requires the schemes to review their provisions if the financial projections show that the benefit level threatens to go down below the prescribed level before the next actuarial valuation.

Another disadvantage is that the restrictions imposed on activating the modified indexation delay the activation under the deflationary economy. It will result in a much lower benefit level for

the future generations. Whether the restrictions should be deleted is now on the reform agenda and will be discussed in due course.

Furthermore the Japanese modified indexation does not necessarily restore financial equilibrium of the schemes if the socio-economic environment deteriorates beyond a certain limit.

6. Concluding remarks

In summary the ABMs of Canada, Sweden, Germany and Japan have the features summarised in the following table. When considering introduction of ABM, these features should be taken account of. Also when reviewing the ABM already in place, they should also be compared.

Issues	Canada	Sweden	Germany	Japan
Does the ABM exactly restore the financial equilibrium?	almost	to some extent	almost	to some extent
Necessary to change the benefit design?	no	yes	no	no
Sharing the "pain" between workers and beneficiaries?	yes	to some extent	to some extent	to some extent
Giving rise to anxiety that the contributions would go up endlessly?	no	no	no	no
Giving rise to anxiety that the benefit would fall to lose adequacy?	no	to some extent	to some extent	benefit floor
Actuarial valuations involved in deciding the activation of ABM?	yes	no	no	yes
Contribution rate or programme fixed?	no	yes	upper limit	yes

(References)

= For Canada Pension Plan=

Robert Brown (2008): Reforms to Canadian Social Security 1996-97; Ten Years Later: A Report (Card)

Jean-Claude Ménard (2013): Intergenerational balance of the Canadian retirement income system
Office of Chief Actuary, Office of the Superintendent of Financial Institutions Canada: The 25th
Actuarial Report on the Canada Pension Plan as at 31 December 2009

=For Sweden=

Edward Palmer (2000): The Swedish Pension Reform Model: Framework and Issues

Ole Settergren and Boguslaw D. Mikula (2005): The rate of return of pay-as-you-go pension systems: a more exact consumption-loan model of interest

Swedish Pension Agency: Orange Report: Annual report of the Swedish Pension System 2011

=For Germany=

Axel Börsch-Supan and Christina B. Wilke (2004): Reforming the German Public Pension System

=For Japan=

Ministry of Health, Labour and Welfare (2013): The Point of the Pension Plan

http://www.mhlw.go.jp/english/org/policy/dl/p36-37_1.pdf

Actuarial Affairs Division, Pension Bureau, Ministry of Health, Labour and Welfare (2009):

Actuarial Report on the Employees' Pension Insurance Scheme and the National Pension Scheme (it is in Japanese, but it contains an executive summary in English on pages 33-48.)

<http://www.mhlw.go.jp/topics/nenkin/zaisei/zaisei/report2009/pdf/all.pdf>

Junichi Sakamoto (2005): Japan's Pension Reform