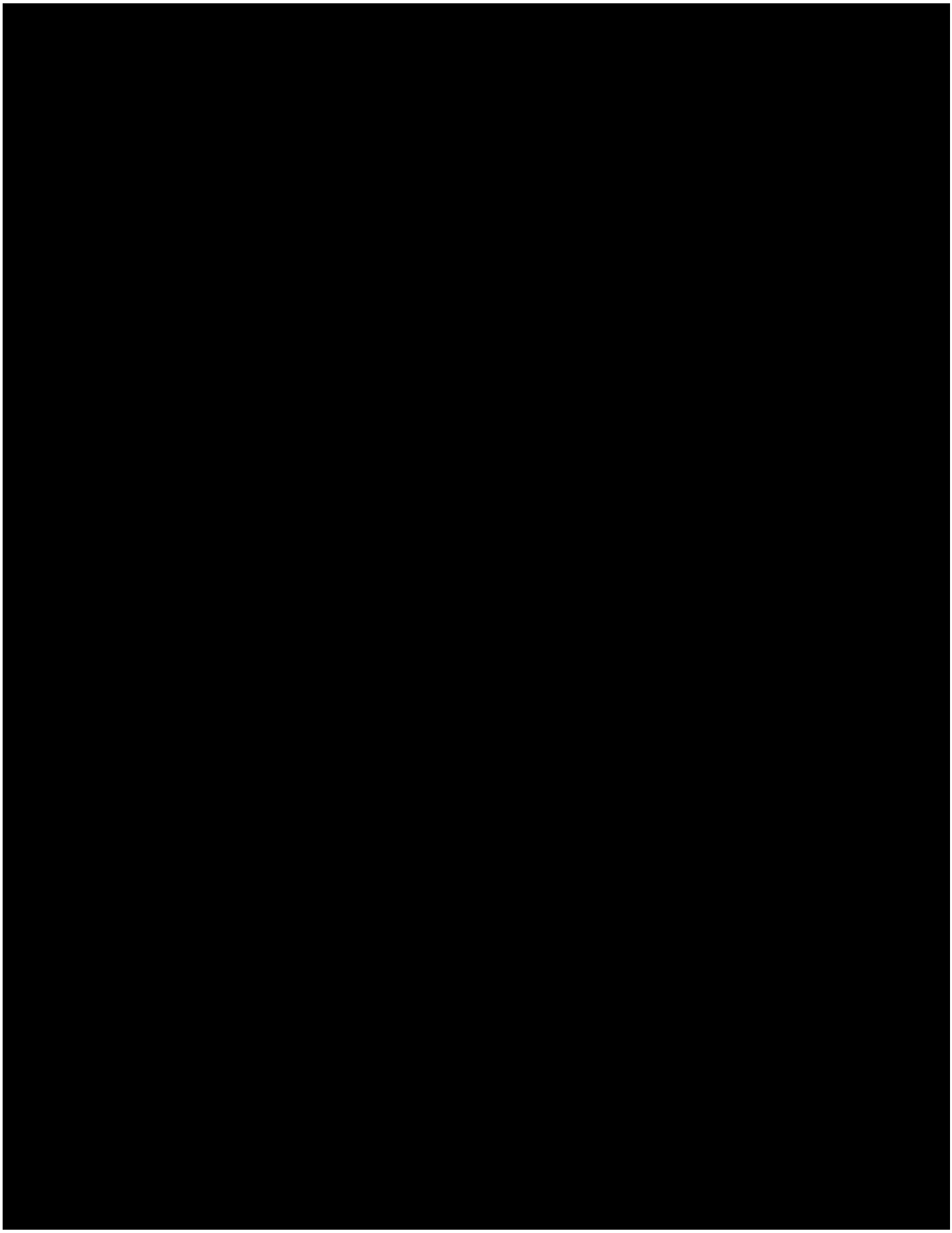

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# Automatic Adjustment Mechanisms in Asian Pension Systems?

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Authorized for distribution by Luc Everaert

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## Abstract

Automatic adjustment mechanisms (AAMs)—rules ensuring that certain characteristics of a pension system respond to demographic, macroeconomic and financial developments, in a predetermined fashion and without the need for additional intervention—have been introduced in many OECD countries to tackle public pension schemes' deteriorating financial sustainability. Incorporating AAMs—in particular linking retirement age to life expectancy—can be an important part of pension reforms in Asia. If implemented early, AAMs could help prevent the need for sharp adjustments in the future, increase the predictability and inter-generational equity of pension systems and enhance confidence.

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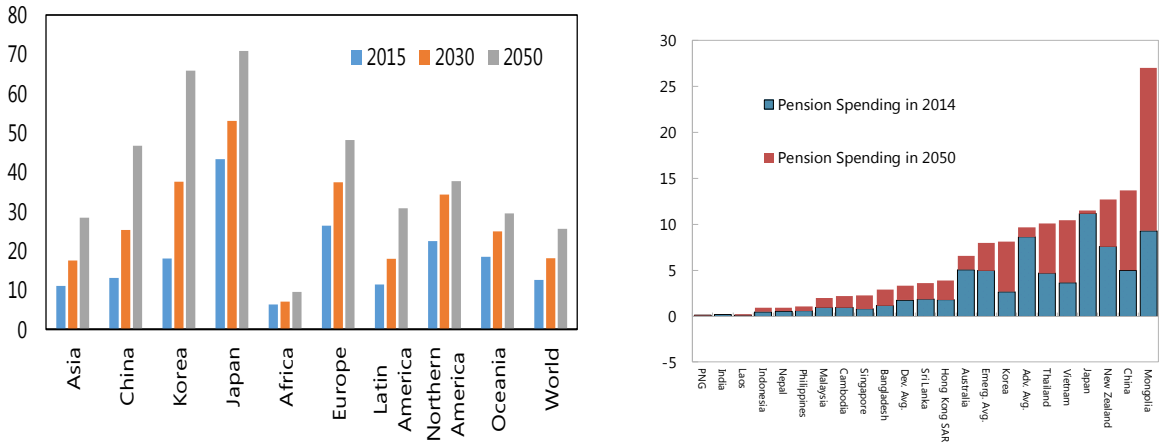
## I. INTRODUCTION

Asian economies are aging fast, with significant implications for their pension system finances. While some countries already have high dependency ratios (Japan), others are expected to experience a sharp increase in the next couple of decades (China, Korea, Singapore). The projected pace of aging in many countries in the region surpasses that of other countries that went through a similar transition (Figure 1). This has two main implications. First, pension system deficits can increase very quickly, limiting room for policy action and hampering fiscal sustainability. Second, the projected aging of populations can have large intergenerational equity implications. Both imply an urgent need to reform pension systems to achieve sustainability and ensure equity[2]. This paper explores how incorporating Automatic Adjustment Mechanisms (AAMs)—rules ensuring that certain characteristics of a pension system respond to demographic, macroeconomic and financial developments, in a predetermined fashion and without the need for additional intervention—can be part of pension reforms in Asia.

**Figure 1. Old Age Dependency Rate and Pension Spending in Asia**
(ratio, percent of GDP)




Sources: UN Population Projections (left panel), IMF Fiscal Monitor Projections (right panel)

AAMs have been in operation for almost a century. In 1922, Denmark introduced price indexation of benefits, replacing ad-hoc increases (Gerig, 1960).[3] After WWII – not the least because of the threat of accelerating inflation – price indexation became common in developed countries. Until recently, however, the parameters which adjusted automatically were usually benefit levels, contribution ceilings, and past earnings entering the benefit

[2] See WB (2016), OECD (2013) and ADB (2012) for detailed analyses of the economic and fiscal impact of aging in Asia.

[3] In 1922, Danish pensions were linked to the cost-of-living adjustment for the salaries of government employees. This was repealed in 1927. In 1933, pensions were linked to changes in the national price index (Gerig, 1960).

formula. It is worth noting that all of these "traditional AAMs" aimed at protecting the value of current pensions or that of accrued entitlements.[4] Other considerations – such as fiscal sustainability or the adequacy of benefits at the bottom of the benefit distribution – have only emerged recently.

More recently, AAMs have come to the forefront to help address financial sustainability concerns of public pension systems. Social insurance pension systems are dominated by defined benefit schemes, pay-as-you-go financed, with liabilities explicitly underwritten by the government. In these systems, individuals generally contribute a percent of their salary during their work lives, with pensions typically based on a formula depending on the years of contributions and the salary levels. While it is possible to design pay-as-you-go defined benefit pension schemes which are in balance, this requires collecting contributions at the long-run equilibrium levels and accumulating reserves in the early decades of operations. For economic, historic and political reasons, this approach was rarely pursued. Consequently, these systems, under their previous contribution and benefit rules, are unprepared for population aging and need to implement parametric reform or structural reforms in order to reduce the level or growth rate of their unfunded pension liabilities.

The rationale behind AAMs is largely of political economy in nature. The political cost of regulatory changes often leads to procrastination, postponement or reversal of reforms which, over the longer run, have fiscal costs, requiring even harsher measures at a later date. Automatic adjustments can theoretically make the reform process politically less painful and more likely to succeed. Adaptive rules become the default: governments have to act not if they want to introduce changes but if they want to keep automatic changes from happening. AAMs can thereby increase the likelihood of parametric changes taking place, to the extent necessitated by sustainability or adequacy objectives and with more limited political trade-offs. AAMs can also improve intergenerational equity and offer higher transparency and predictability about pension benefits relative to one-off pension reforms, which typically require sharper adjustments. Finally, similar to fiscal rules, AAMs can serve as a signal of commitment to fiscal sustainability and improve credibility.

In this paper we first provide a discussion of the rationale and structural features of AAMs as well as considerations for their design and implementation drawing upon the international experience (Section II). In the rest of the paper, we discuss the scope for their introduction in Asia's pension systems. This includes country cases for Japan, Korea and China. All three countries are aging fast, but Japan stands out in terms of its significantly more advanced position in its demographic transition and the fact that it has already introduced an AAM. Korea has a relatively young pension system but is aging fast, while China is facing an aging society at much lower income levels. These case studies potentially offer useful lessons and

[4] This is true for contribution ceilings too since insurable incomes (defining the extent of contribution liability) are usually harmonized with (or the same) as pensionable earnings (determining starting pension levels).

policy recommendations for other countries in the region.

Several lessons emerge from our analysis. First, there is important room to incorporate AAMs in the region. One attractive option is to link statutory retirement ages—which seem relatively low in the region—to longevity or other sustainability indicators. This would at the very least help ameliorate the impact of life expectancy improvements in the finances of public pension systems. If implemented early, AAMs could help prevent the need for sharp adjustments in the future especially for countries with less mature systems or countries with limited existing financial imbalances. In addition, they can increase the predictability and inter-generational equity of pension systems. AAMs can be an important signaling instrument, indicating policymakers' commitment to the pension system's long-term sustainability. This could enhance confidence and compliance. However, AAMs are not a silver bullet. They can help slow down the accumulation of unfunded liabilities related to demographic and macroeconomic changes, but they are not substitutes for major parametric and structural reforms which establish a new baseline which AAMs can then help maintain.

## II. Automatic Adjustment Mechanisms in Pension Systems

### A. Rationale and Benefits

The rationale behind AAMs is of political economy in nature. A crucial angle of AAMs—arguably, their main identifying feature—is legal and procedural. The political cost of regulatory changes often leads to procrastination, postponement or reversal of reforms which, over the longer run, have fiscal costs, requiring even harsher measures at a later date. Replacing standard, static legislative logic with dynamic legislation, it makes adaptive rules the default: parliaments would have to act not if they want to introduce changes but if they want to keep automatic changes from happening. Making self-adjusting parameters the default and requiring regulatory intervention only if these rules need to be revised or suspended can potentially introduce a profound procedural and political change into policymaking. AAMs thereby increase the likelihood of parametric reforms taking place without delay, to the extent necessitated by sustainability or adequacy objectives.

AAMs can also help prevent the build-up of inequity across generations due to the pension system and aging. The distributional effects of AAMs would depend on the specific design and the type of parameters used to adjust (for example benefits versus contributions). The very presence of AAMs may also act as a signaling instrument, indicating policymakers' dedication to the pension system's long-term sustainability and, in a manner similar to pre-commitment rules in fiscal and monetary policy, they can ensure credibility, improve confidence and compliance. AAMs can also be viewed as a commitment to gradual, less painful adjustments as opposed to occasional, large reforms potentially implying unexpected extra burdens (of benefit cuts or additional taxes).

With respect to the political economy advantages of AAMs, it may be too early to make an assessment—most AAMs were introduced in the wake of major parametric reforms and the

real test will be whether they will be implemented when the exogenous indicators anchoring the AAMs clearly call for adjustments. It is conceivable that pension parameter adjustments triggered by AAMs do not get implemented if they face opposition from the public. In Japan, the introduction of its AAM seems to have reduced policy uncertainty but it was only allowed to operate recently due to persistent wage and consumer price deflation, a factor which can pose a challenge for the effectiveness of the AAM going forward.

## B. A Structural Framework

There are four main structural features characterizing AAMs which are typically elevated into formalized legislation: (1) the trigger variables (i.e. the indicators used in determining when and how an adjustment should be made); (2) the adjusting parameters that are linked to the trigger indicators; (3) the frequency of adjustment; and (4) the boundaries of adjustments. We discuss these key features in return and the considerations for their use and applicability to different pension systems. Table 1 provides a summary with country examples.

**Table 1. Characteristics of AAMs-Trigger and Adjustment Variables**

| Country Examples Associated With Different Trigger and Responding Parameters | | | *Trigger Variables* | | | | |
|---|---|---|---|---|---|---|---|
| | | | Ex-post Trigggers | | | | Ex-ante Triggers |
| | | | age-specific/cohort-specific life expectancy | system dependency (ratio of pensioners to workers) | contributory years to length of benefit receipt | current deficits | future expenditures and deficits |
| *Adjustment Variables* | Benefit Levels | benefit indexation | Finland, Portugal | Japan | | | Germany, Canada |
| | | annuity divisor | Sweden, Latvia, Poland, Italy | | | | Sweden, Latvia, Poland, Italy |
| | | other reductions in benefits | | | | US | |
| | Eligibility criteria | retirement age | Canada, Germany, Greece, Norway, Finland, Portugal, Czech Republic | | | | Denmark |
| | | minimum qualifying service time for full pension | | | France | | |
| | Contributions | contribution rates | | | | | Germany, Canada |

***Trigger Variables:*** The trigger variables could be *prediction-based (ex-ante)* or *state-of-the-world (ex-post)*. For instance, adjustments based on certain sustainability indicators—such as unfunded liabilities, future changes in GDP-proportional expenditures or forward-looking benefit indexation—are based on projections and expectations. Observed improvements in life-expectancy or backward-looking benefit indexation are examples of ex-post mechanisms. While both approaches can give the same long-term results, they also have drawbacks. Prediction-based AAMs may require feed-back mechanisms to correct for the difference between the expected and observed values of the indicators used for triggering AAMs; state-of-the-world AAMs, at the same time, imply a delayed reaction which may necessitate larger or faster adjustments, or may reduce the expected fiscal impact. Indicators must be measurable and, to some degree, predictable to allow time for adjusting their behavior,

including the scheme members' labor supply and savings decisions or policymakers' approach to other public expenditure and revenue items.

***Adjustment Parameters:*** There are three broad categories of parameters that can be adjusted using AAMs: *benefit levels*, *eligibility criteria* and *contribution rates*.

*Benefit levels* can be adjusted through benefit indexation, valorization of past earnings or other reductions reflecting improvements in life expectancy at retirement or financing shortfalls. The benefit indexation rules (how the benefits are linked to wage and price inflation) can have a significant impact on pension finances by directly affecting the real growth of pension benefits. Examples of benefit indexation rules whereby the degree of indexation depends on system dependency include the AAMs in Germany, Canada, Japan, and Portugal. The valorization of past earnings entering the pension formula can have a profound effect on starting pensions as well. It is commonly used in an automatic mechanism to ensure intergenerational equity but not as an automatic balancing mechanism. The reason for this is that valorization only effects new retirees but does so retroactively. In Finland, Portugal and Germany benefits are linked to improvements in life expectancy at retirement through a "life expectancy coefficient" or a "sustainability factor"[5]. In addition, benefits can be adjusted automatically to respond to financing shortfalls. This is the case in the United States, where social security benefits will be automatically cut when the pension reserves are exhausted (Gillingham, 2010). In Sweden, Italy, Poland and Latvia these adjustments happen automatically, within notional defined contribution (NDC) schemes where the annuity factor is regularly amended to keep notional retirement balances in line with the present value of expected payouts.[6]

Under *eligibility criteria*, retirement age is the one most often adjusted automatically. Increases usually reflect improvements in life expectancy ensuring that the expected period of benefit receipt is kept constant—as is the case in Canada, Greece, Finland[7], and Portugal.[8] In Denmark, a procedural automatism has been instituted: every five years, the retirement age is reviewed, opening the possibility for retirement age increases if the public scheme's

[5] In Germany, the link to life expectancy is indirect and happens through the dependency ratio.

[6] Automatic adjustment typically happens through two instruments: notional returns credited to individual accounts which reflect long-term expectations of per capita GDP growth; and adjusting the annuity factor (the operator translating notional retirement balances into periodic benefits) to life expectancy at retirement.

[7] Finland's 2015 pension reform increases the retirement age to 65, starting in 2017, and links subsequent increases to improvement in life expectancy.

[8] Whether life expectancy improvements lead to adjustments in benefits or retirement ages depends on the nature of the system, too. In NDC schemes, there is statutory retirement age above the earliest permissible age: since retirees accrue a (notional) retirement balance, they are free to choose their age of retirement which will determine the monthly benefits which are commensurate with the given retirement balance. Longer life expectancies, *ceteris paribus*, will mean lower monthly pensions. In defined benefit schemes, it is monthly pensions which result from the pension formula – thus, it is through retirement age increases that the relationship between total contributions and retirement wealth (the sum of monthly payments) can be maintained.

financial position so requires. The Czech Republic introduced an automatic retirement increase of 2 months per year, based on expected improvement in mortality. Other benchmarks can also be devised: for instance, retirement increases which keep the ratio of expected contributory and beneficiary years constant (as in France where the policy objective is to maintain a 2/3-to-1/3 ratio between economically active periods and retirement).

*Contribution rates* are rarely used for automatic adjustment. While many countries change temporarily or permanently their social security contribution rates in response to labor market tensions or to improve their public pension scheme's sustainability, only Germany decided to automatically adjust contribution rates if they fall behind the level required for medium-term cash balances. Canada uses contribution rates in its AAM, both as an operating variable and a trigger for automatic expenditure-side adjustments. Contribution rates increase if (a) the legislated rate is below the level required for sustainability, as defined by law, and (b) the government failed to introduce other measures aiming to address sustainability concerns. At the same time, if contribution rates increase, benefits are also nominally frozen for three years (until the publication of the next actuarial assessment).

***Frequency of Adjustments:*** The frequency of changes is also important and needs to be determined by law. It may be autonomous or contingent on exogenous variables: for instance, benefits may be indexed annually; while automatic retirement age increases may happen when observed improvements in life expectancy at retirement reach a pre-determined level (such as an additional year). Infrequent changes or reviews of trigger indicators can lead to larger adjustments. For administrative reasons, automatic adjustments typically take place once a year or less frequently.

***Boundaries of Adjustments***: Last, the boundaries of applying AAMs also need to be determined. These boundaries can be expressed in terms of the frequency of changes, individual adjustments or compounded impact. For instance, automatic pension indexation may be delayed until compounded price inflation since latest adjustment reaches a pre-determined level; its frequency may be linked to inflation (requiring more frequent indexation in times of high inflation); and the automatism may be temporarily replaced by discreet decisions if inflation rates exceed a certain level. The bound of applicability is also important in order to protect the pension system's basic features or the general government's finances against the impact of quickly changing trigger indicators and the compounded effect of adjustment parameters. For instance, during periods of hyperinflation, automatic price indexation of pensions may prove prohibitively expensive; cash rationing benefit outlays to reflect contribution revenues may damage the system's earnings-related nature or the adequacy of pensions. Pension systems can have more than one AAM: retirement ages can respond to changes in life expectancy at retirement while accrual rates may adjust to the expected change in unfunded liabilities. In such cases, the precedence of these AAMs needs to be established by law.

AAMs can be introduced in any kind of pension system (Table 2). In defined benefit or point

systems, AAMs can be introduced to adjust benefits, eligibility criteria or contributions to improve financial sustainability or intergenerational equity. In defined contribution and notional defined contribution systems financial sustainability in inherent in the system design. In fact, these types of pension systems already incorporate automatic adjustments in benefits. Nevertheless, it is possible to incorporate other automatic adjustments—for example in eligibility criteria and contributions—to improve pension adequacy.

**Table 2. Characteristics of AAMs-Types of Pension Systems**

| Types of Pension Systems and AAM Adjustments | | Defined Benefit Systems | | | Defined Contribution Systems |
|---|---|---|---|---|---|
| | | Traditional Defined Benefit | Notional Defined Contribution (NDC) Systems | Point Systems | |
| Type of Adjustments | Benefits | √ | Adjusted depending on contributions and notional returns | √ | Adjusted depending on contributions and asset returns |
| | Eligibility Criteria | √ | √ | √ | √ |
| | Contributions | √ | √ | √ | √ |
| Rationale/Benefits | Sustainability/Credibility | √ | √ | √ | Financial sustainability, intergenerational equity already achieved by system design |
| | Intergenerational Equity | √ | √ | √ | |
| | Adequacy | | √ | | √ |
| Examples | | Japan, US, Greece, Norway | Sweden, Italy, Poland, Latvia | Germany, France, Russia | Singapore, Malaysia, Indonesia |

Note: Check marks indicate the applicability of AAMs.

Finally, we have so far mainly discussed AAMs that call for automatic adjustments in certain systemic parameters, or the "strong" form of AAMs. AAMs can also take the "weaker" form of initiating a process which may lead to adjustments. In some countries indicators act only as triggers for a reform process while in others the weak and the strong form of AAMs are combined. For example, in Japan additional reforms are called for if and when the replacement rate falls under 50 percent. In Canada, if the government fails to act in response to the pension scheme's deteriorating financial prospects, the scheme administrator must temporarily suspend benefit indexation.

## C. Considerations

Adjustments introduced through automatisms face the exact same trade-offs between fiscal sustainability, adequacy and equity as ad-hoc or one-off reform measures. This reflects the fact that AAMs essentially affect the legislative process through which pension reform is introduced. Similar to other parametric reforms, while AAMs can improve sustainability, they can harm adequacy in some cases (OECD, 2012). But this is less related to the automatic nature of the adjustment: all reforms with an impact on the financial sustainability of pension system can influence equity or adequacy or both, irrespective of whether they are self-triggered or introduced by discreet legislation. AAMs' main benefit is in their predictability and simplicity: a selected variable triggers a change in the system's parameters, according to straightforward rules.

Nevertheless. equity and adequacy considerations should be kept in mind when designing AAMs. For instance, automatic price indexation may have a small impact on relative pension levels (average pensions compared to average wages in the same period) but over time, this policy erodes pension levels so much that, eventually, an upward level shift in benefits may become necessary. On the other hand, deflation could raise pension levels in relative terms if indexation is not designed to work under deflation. For example, in Japan if and when the replacement rate is projected to fall under 50 percent in 5 years, additional reform measures will be called for; if and when the difference in pension benefits among pensioners becomes significantly large, correcting measures will be taken to secure equity. Similarly, automatically raising retirement ages for all individuals in line with life expectancy at retirement may need to be reconsidered: people with different educational attainment and skill levels not only have different life expectancies but also have very different chances of finding employment late in their careers, thus retirement age increases may simply deny them pensions without the opportunity to make up for lost income by working longer.

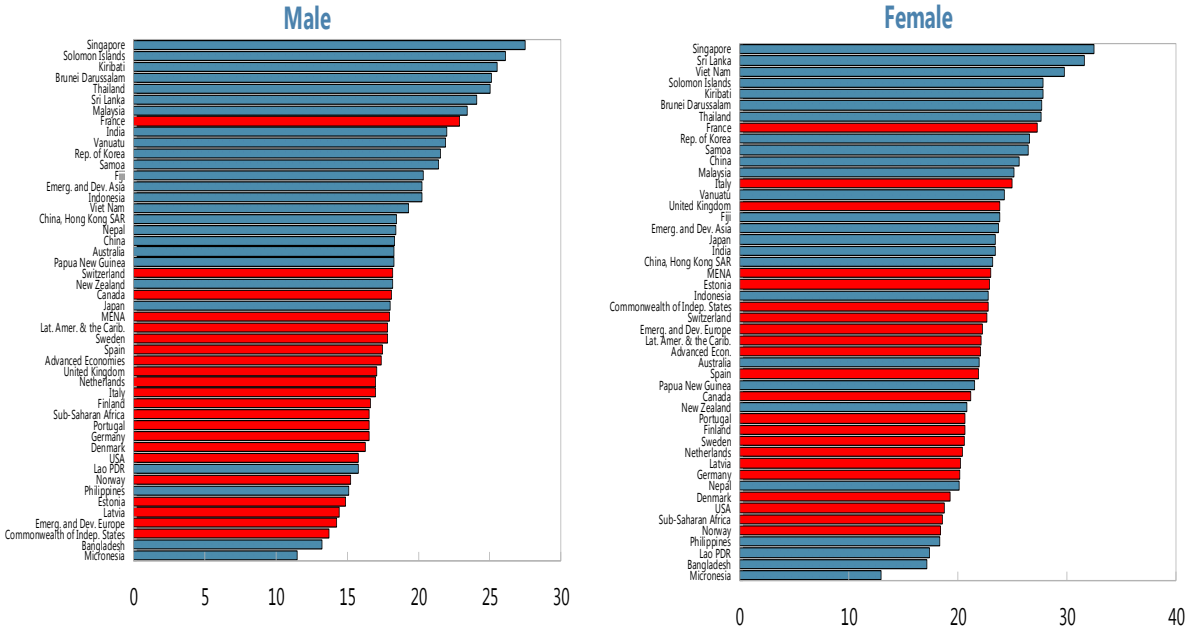
AAMs can also interact with other institutional features of the economy, especially in labor markets. For example, in Japan the majority of employment is under life-time contracts which could interact with an AAM that calls for automatic adjustments in pension age. There might also be challenges if there is limited demand for older workers which could reflect structural features of the economy and the labor market. AAMs can also affect the behavior of workers in terms of their labor supply and saving decisions or investment in human capital if they are aware of the potential changes likely to be triggered by AAMs. To allow for the right private sector response, it is critical to provide enough and timely information about the AAM and allow smooth and gradual adjustments.

## III. Automatic Adjustment Mechanisms in Asian Pension Systems

There is significant scope to introduce automatic indexation of retirement age to changes in life expectancy across pension systems in the region. While some countries have already raised the retirement age over time (Japan, Korea), pension systems in Asia do not yet feature automatic links between retirement age and life expectancy. Furthermore, expected years in retirement is typically higher in Asian than in other countries and regions (Figure 2, Asia shows in blue). The case studies for Korea and China (section IV) suggest that automatic indexation of retirement age to life expectancy can indeed help reduce the pension system’s financial imbalances.

**Figure 2. Expected Years in Retirement, 2015**

(Life expectancy at the retirement age, Asian economies in blue)




The larger role played by defined contribution schemes in Asia reduce the scope for using AAMs for financial sustainability purposes. Many Asian economies (Hong Kong, Singapore, Australia, Malaysia and Indonesia) have defined contribution systems, while others have defined benefit schemes (Japan, Korea, Thailand, and Vietnam) and some have elements of both (China and India) (Table 2). AAMs can play an important role to enhance the sustainability of defined benefit systems. For defined contribution schemes, under which system sustainability is typically inherent, AAMs can still play a role by ensuring pension adequacy, for instance through indexation of retirement age to life expectancy. This could be relevant in Singapore, Malaysia and Indonesia which have relatively high expected years in retirement[9].

While AAMs would be beneficial regardless of position in demographic transition, they are not likely to be sufficient to solve financial imbalances in countries that are aging fast. Asian countries are projected to age at different speeds—for some countries aging is imminent (Korea, Hong Kong, SAR, Singapore, China, Thailand, Brunei) or is already well underway (Japan), while for others it is taking place at a relatively more moderate (Vietnam, Malaysia) or slow pace (India, Indonesia, Mongolia, Cambodia) (Figure 3).

[9] In Singapore the re-employment age (the age ceiling up to which firms are legally required to offer re-employment) has been increased over time, taking into account increasing life expectancy and people's ability to work longer. This has enabled older Singaporeans who are able and willing to work beyond the retirement age of 62 to do so. In Singapore and other defined contribution systems, members are also typically given the option to delay the start of their retirement payouts, allowing them to grow their savings further and subsequently receive permanently higher pension payouts.

**Table 3. Characteristics of Public Pension Systems in Asia and Pacific Economies**

| | | Position in Demographic Transition | |
|---|---|---|---|
| | | **Fast Aging** | **Aging further out** |
| **Risk Sharing** | Defined Benefit | Korea, Japan, Thailand, New Zealand (superannuation) | Philippines, Lao PDR, Mongolia, Vietnam, Timor-Leste |
| | Defined Contribution | Hong Kong, SAR, Singapore | Malaysia, Indonesia, Sri Lanka |
| | Mixed | China (DB and NDC components) | India, Australia |
| | **No pension system** | | Myanmar, Cambodia |

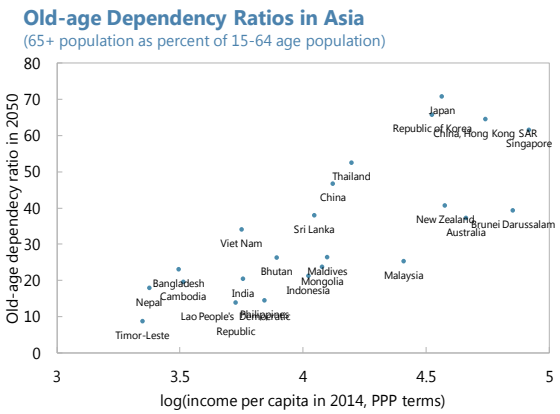
Sources: World Bank (2016), OECD (2013)

- In Japan, the AAM has been introduced when the pension system had already matured and social security expenditures were already high, to prevent further deterioration in system imbalances. Indeed, the projected change in pension spending in Japan is among the lowest among advanced economies and in Asia (Figure 1).

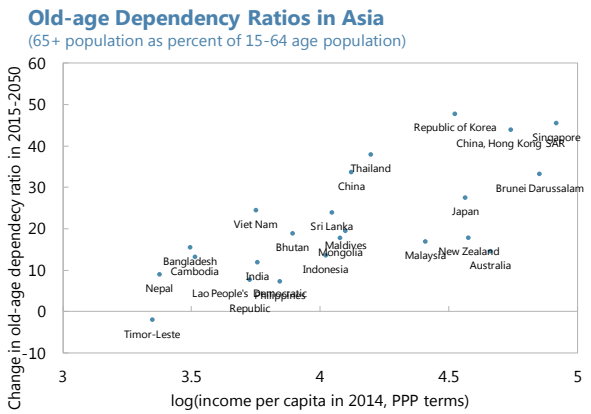
- For countries that are aging fast, AAMs can play a useful role in slowing down the accumulation of imbalances, but they need to be complemented with more fundamental parametric and structural reforms (see Korea and China case studies).

- For the group of countries that are relatively young it would be easier to link system parameters to sustainability or other exogenous indicators to prevent potential imbalances from emerging. The priority for those countries would be to first ensure that the pension system is close to its target state in terms of coverage, fiscal sustainability, benefit adequacy and equity. In these countries incorporating automatism into pension systems could also take place at the level of pension system design, for instance through introducing notional defined contribution (NDC) schemes which include built-in automatic adjustment and balancing mechanisms.

**Figure 3. Old Age Dependency Rate in Asian Economies 2015–50**



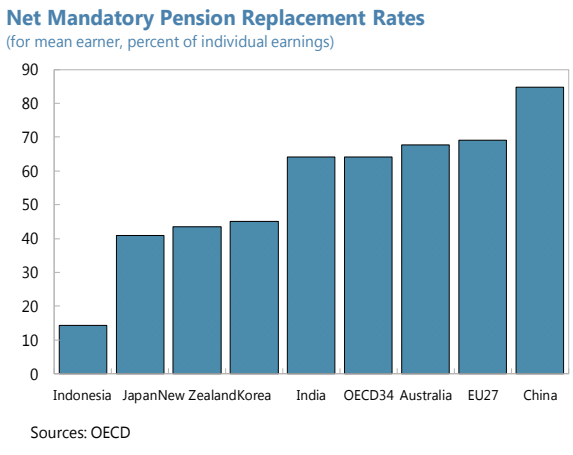

Sources: United Nations Population Projections and World Bank

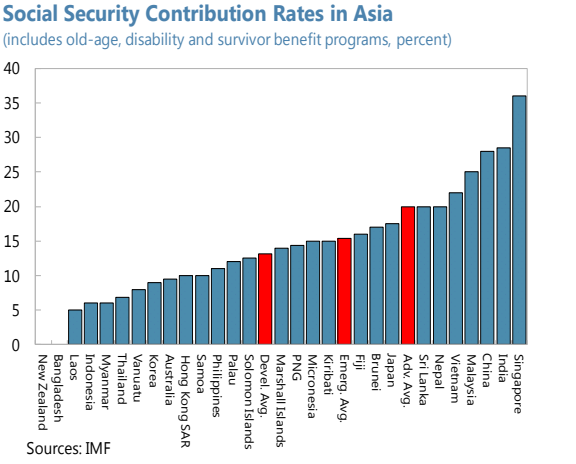



Sources: United Nations Population Projections and World Bank

Some countries in the region may have limited scope to reduce benefits, requiring greater reliance on AAMs with adjustments to eligibility criteria. AAMs are typically used to adjust benefits or eligibility criteria—Germany's AAM is one of the few examples with an adjustment on the contribution rates—but in some countries in the region there may be limited scope to adjust benefits given adequacy considerations (for example Korea). In those cases, AAMs may need to rely on adjusting the eligibility criteria—namely adjustments to retirement age in line with mortality or with changes in the financial sustainability of the pension system as discussed above. Since raising contribution rates can have important effects on the labor market and growth, it would be important to prioritize other adjustments. However, in some cases where contribution rates are relatively low and the financial imbalances large, contribution rate adjustments may be needed.

**Figure 4. Pension Benefit and Social Security Contribution Rates in Asia**




Fragmentation in pension systems in some countries should be kept in mind in considering the applicability of AAMs. Pension systems in many Asian countries are fragmented, with different funding and benefit schemes for different categories of workers. For instance, it is common across Asia for pension systems to have separate schemes for the civil service, military, and state-owned enterprises, often with different funding models and benefits. Japan consolidated four separate pension schemes for employees into one in 2015, although dependents of employees and self-employed people are still treated separately. In China, there are distinct systems for enterprise workers, rural and urban residents, administered at the provincial level. In Malaysia, the main pension system is defined-contribution but the civil servants' pension system is defined benefit and has large unfunded liabilities. Applying AAMs could be more complicated in fragmented systems (for instance in adjusting retirement age with changes in mortality) and some consolidation may be needed before adopting AAMs.

## IV. Case Studies

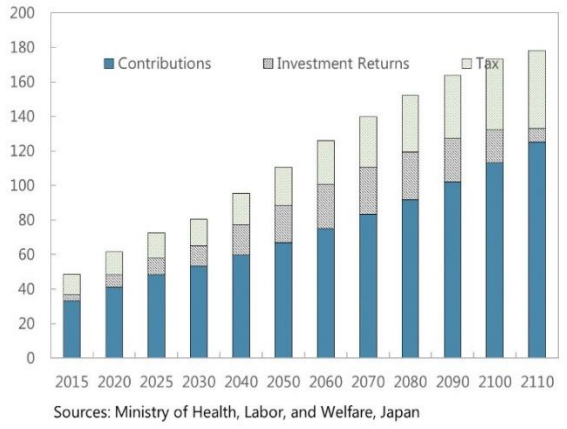
In this section we present three country cases from Asia: Japan, Korea and China. Japan is to

our knowledge the only country in the region that already has an AAM. We discuss Japan's experience and potential lessons for other countries. Korea has a relatively young pension system but is also one of the fastest aging countries in the region. We study the implications of increasing retirement age with increases in life expectancy in terms of financial sustainability and intergenerational equity. Finally, China is facing an aging society at a much lower income level and the case study demonstrates the need for a comprehensive reform strategy that entails AAMs and other structural reforms.

## A. Japan

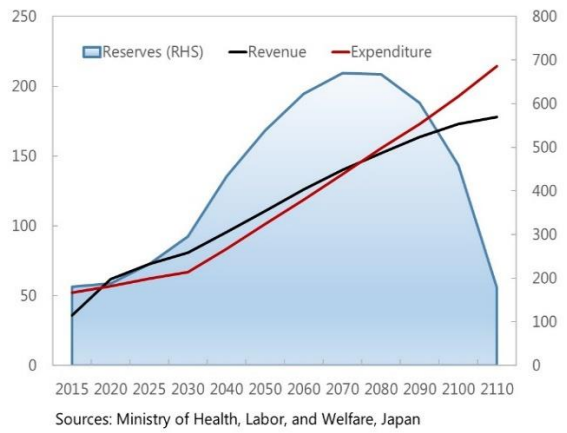
Japan introduced a universal public pension system in 1961. It is a defined-benefit scheme, and despite the significant amount of financial assets held by public pension funds (most notably the Government Pension Investment Fund (GPIF)), it is essentially run on a pay-as-you-go basis. The system has three categories of insured and three tiers of contributions and benefits. First, employees pay contributions broadly in proportion to their earnings[10], and receive both the basic pension (first tier) and benefits based on their past contributions (second tier). Second, dependents of employees are exempt from paying contributions, but entitled to the basic pension. Third, others (e.g., the self-employed and their spouses, unemployed) pay a fixed amount and receive the basic pension. Finally, voluntary pension schemes provide the third tier of the system, either through employers, insurance companies, or public entities.

**Figure 5. Revenue Composition**
**2014 Re-examination Scenario E,** (trillion yen)




Sources: Ministry of Health, Labor, and Welfare, Japan

**Figure 6. Pension Finances**
**2014 Re-examination; Scenario E,** (trillion yen)



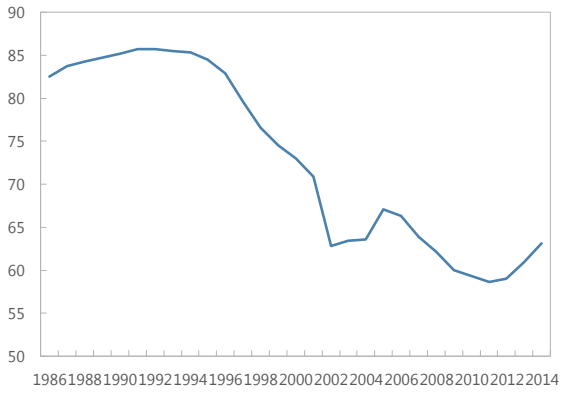

Sources: Ministry of Health, Labor, and Welfare, Japan

In order to secure the sustainability of pension finances amid rapid ageing, in 2004, the government embarked on a comprehensive reform. Key pillars include the introduction of an AAM ("macroeconomic indexing") and a gradual increase in pension

[10] The existence of the lower and upper limits on contributions makes the system somewhat regressive.

contributions: pension benefits are automatically adjusted to demographic changes (i.e., size of labor force and longevity); contribution rates are being gradually increased until fiscal year 2017, after which they are fixed. After the increases in contribution rates are complete, adjustment of the replacement ratio[11] will be a key mechanism to secure pension sustainability: if and when the replacement ratio is expected to go below 50 percent by the next quinquennial re-examination of pension finances, additional reform measures will be called for.

**Figure 7. Pension Contribution Compliance**
(Percent; National Pension)




Sources: Ministry of Health, Labor, and Welfare, Japan

Reflecting rapid ageing and stagnant nominal growth, public pension spending increased from 5.2 percent of GDP in FY1990 to 10.9 percent of GDP in FY2012. Tax-financed spending also increased to 2.5 percent of GDP in 2011 partly because of an increase in the ratio of the government subsidy to the basic pension benefit. Moreover, in FY2000 through FY2002, the pension benefit was kept constant by special laws although it was supposed to be reduced reflecting price declines due to the rule of full price indexation at that time. However, the 2004 reform, if implemented as planned, is expected to reduce policy uncertainty and contain growth of pension spending in relation to GDP. This is reflected in projections by the IMF's Fiscal Monitor which show that increases in pension spending in Japan to be much smaller than in its peer countries (Figure 1). The 2004 comprehensive reform was also expected to improve Japan's declining compliance ratio given its positive effect on sustainability and intergenerational equity. There has been some progress in recent years, but other factors could be at play including a potential lack of confidence in public finances more broadly.

Although the 2004 reform has strengthened the financial sustainability of Japan's pension system, there is room for improving credibility and reducing reliance on tax revenue.

Options include:

- *Using more prudent assumptions on key parameters and reasonable scenarios*. The soundness of pension finances for the next hundred years is re-examined every five years, but its credibility depends on the realism of assumptions. For example, inflation was expected both in the 2004 reform and in the 2009 re-examination to rise to 1.0 percent, which did not happen. Also, long-term TFP growth was assumed in the 2009 exercise at

[11] Defined as the ratio of household pension benefits of a new pensioner to the wage of a representative household.

1.0 percent, which is currently beyond reach[12]. In the past, there were repeated downward revision of projections on the total fertility rate and thus population, which potentially contributed to slowing efforts to reform the social security system including the pension system. The 2014 re-examination of pension finances shows that under prudent scenarios,[13] the replacement ratio will hit the 50 percent floor around 2035–40.

- *Making the AAM ("macroeconomic indexing") work better under a low price/wage inflation or deflation environment*. Japan's AAM is not designed to operate under deflation (see Box 1). The government's analysis included in the 2014 re-examination of pension finances shows that under the current scheme, macroeconomic shocks and fluctuations including in inflation would lead to a lower replacement ratio than in the baseline. To address this shortcoming, the government submitted a bill in March 2016 to allow a part of the indexing which is not fully reflected in the pension adjustment to be reflected in later years. Allowing the macroeconomic indexing function fully under all circumstances would contribute to more sound pension finances.

- *Further raising the pension age, for example by introducing an automatic link to life expectancy at 65*. The pension eligibility age is being gradually raised from 60 to 65, by 2025 (2030) for men (women) covered by the earnings-linked pension. As Japan's life expectancy is one of the longest among the advanced economies while the pension age is comparable, the gap between average longevity and the pension age is relatively large (Figure 2). Raising the pension age would reduce reliance on tax money and/or improve the replacement ratio while contributing to growth through increasing labor supply[14].

## B. Korea

Population aging is expected to significantly increase Korea's fiscal burden in the future. While Korea currently has one of the youngest populations among OECD countries, the expected speed of its population aging in the coming decades is one of the highest, resulting from low fertility rates and high life expectancy. For Korea's National Pension System (NPS)—the world's third largest pension fund next only to Japan's Government Pension Investment Fund and Norway's Government Pension Fund Global—population aging poses a particularly severe challenge[15].

[12] IMF (2016) estimates that Japan's potential growth will gradually decline from the current 0.5 percent to close to 0 in 2030.

[13] Scenarios A to E assume TFP growth to increase to 1.8 percent in 2023 from the current 0.5 percent, while scenarios F to H to 1.0 percent

[14] Tokuoka (2012) argues that although increasing the pension age and reducing the replacement ratio have a similar impact on the economy, the latter is fairer in terms of intergenerational equality. Kashiwase, Nozaki and Tokuoka (2012) also recommend increasing pension age in line with rising life expectancy as the most attractive reform option for Japan.

[15] The Norwegian Pension Fund Global is not a dedicated pension fund but was created to help addressing, by accumulating savings in a sovereign wealth fund, the consequences of future population aging.

**Box 1. Japan: Automatic Adjustments of Pension Benefits**

There are two stages in the adjustment of annual pension benefits. First, the pension benefits are indexed to wages or headline CPI inflation based on certain rules: (i) the pension amount for new pensioners is adjusted according to the wage increase, while for others it is indexed to headline CPI inflation to maintain their purchasing power; (ii) when price inflation is larger than wage inflation, the pension benefit for all is adjusted using the latter; (iii) when the wage declines while the price increases, no adjustment is done for all pensioners[1]. For example, with CPI inflation of 2.7 percent and a nominal disposable wage increase of 2.3 percent in 2014, the 2015 pension benefit was increased by 2.3 percent for all; with CPI inflation of 0.8 percent and the wage increase of negative 0.2 percent in 2015, the 2016 pension benefit remains the same for all (both before additional adjustments including due to the macroeconomic indexing explained below).

Second, the pension amount is affected by the macroeconomic indexing ("indexing" hereafter), which reflects changes in the number of the insured and the average longevity. The indexing was introduced in the 2004 reform, but first activated in 2015 as "excessive" payouts, caused by the fact that pension benefits were nominally maintained in FY2010–12 despite price declines, needed to be resolved first. A three-stage reduction in benefits in line with the past price declines was completed in April 2015 and an additional adjustment due to the indexing was allowed to happen at the same time. The size of the additional adjustment was 0.9 percent, which comprises a reduction in the number of the insured (0.6 percent) and a rise in the average lifespan (0.3 percent).

The indexing allows the pension benefits to be reduced in real terms and will be in use until pension sustainability is secured.[2] For example, under a moderately realistic scenario in the 2014 re-examination, the indexing is estimated to stop in 2043, after which the replacement ratio remains 50.6 percent. Under a more realistic scenario, the indexing is assumed to stop in 2040 as the replacement ratio hits the floor of 50 percent; if it were allowed to go below, the indexing would stop in 2050, when it reaches 45.7 percent.[3]

The indexing does not work under certain circumstances: When an increase in pension benefits (before the application of the indexing) is smaller than the size of the adjustment due to the indexing, the adjustment to pension is zero instead of negative (for example, when the price increase is 0.5 percent and the indexing is 0.9 percent, the pension stays the same rather than decline 0.4 percent). Similarly, when an increase in pension benefits is zero or negative as happened in 2016, the indexing does not work at all, negatively affecting the pension finances.

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[1] The government plans to index pension benefits to the lower of price or wage growth (applicable to negative price/wage growth cases).

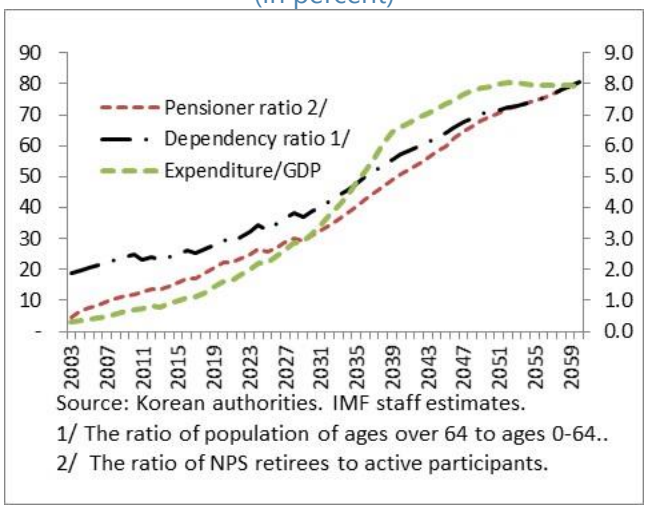
[2] The pension finances are regarded as sustainable when the remaining balance of the pension funds in 100 years is projected to fully cover annual pension benefits at that time.

[3] Scenarios E and F respectively.

The NPS is a social insurance system which was launched in 1988. Active members contribute 9 percent of their income reported for taxes. Retirees then receive pension payments, which are linked to (i) the average income of the entire active participants, (ii) their own life-time income averaged in present value terms, and (iii) the active participation periods. The link is made based on a pre-fixed formula, which make the NPS a defined-benefit pension. The system is partially funded and is currently running a surplus, with accumulated assets at around 30 percent of GDP.

Over time, population aging is expected to materially worsen the system's fiscal position for two reasons. First, higher dependency ratio (i.e. the ratio of the old to the working-age population) will increase the ratio of the pensioners to the active members (Figure 8). Second, pension payments per retirees are set to increase as the pensioner's average active participation periods become longer over time—reflecting continued maturing of the system. In the absence of a change in the contribution rate or the benefits formula, these developments will lead to a worsening of the system's primary fiscal balance (i.e., total contribution revenue minus total pension expenditure). The Korean authorities' latest official forecast shows that the NPS system will turn into an overall fiscal deficit in 2044 and the pension assets will be fully depleted by 2060. The long-term outlook for NPS' finances suggests that there can be a pension-led fiscal cliff driven by population aging if remedial actions fail to be placed in time.

**Figure 8. NPS: Pensioner-to-Active Member Ratio**
(in percent)



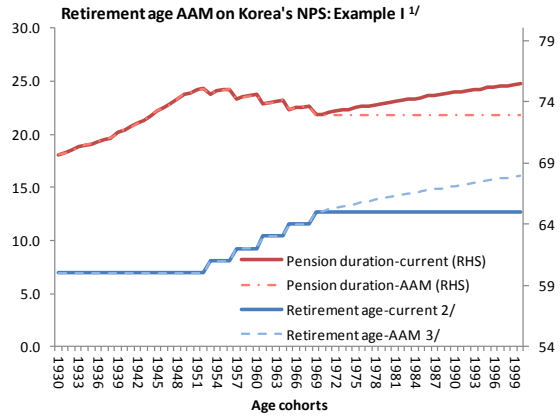
Source: Korean authorities. IMF staff estimates.
1/ The ratio of population of ages over 64 to ages 0-64..
2/ The ratio of NPS retirees to active participants.

Despite its relatively immature system, Korea has already implemented important parametric reforms to tackle its long-run sustainability. For instance, the 1998 reforms increased retirement age and reduced benefit levels and the 2007 reforms involved further reductions in accrual rates. Yet, the NPS is still projected to have sizable unfunded liabilities. Demographic and macroeconomic projections are highly uncertain and there could be other shocks that affect pension system's finances, which implies that incorporating AAMs in Korea's NPS could help restrain the growth in unfunded liabilities more effectively and predictably than one-off reforms. The fact that Korea's pension system has not yet matured is also an advantage in incorporating AAMs. The system dependency ratios are favorable and imbalances are shrouded by current cash surpluses, giving automatic adjustments more scope to make a meaningful difference on the pension system's finances. It is likely to be the case that AAMs are also politically easier to introduce into young systems where the impact of

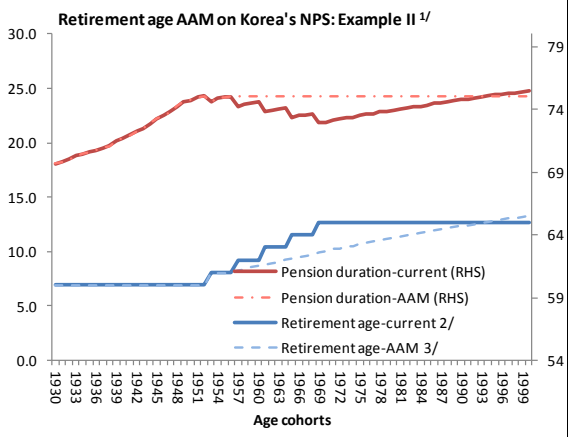
these policies is distant, providing members with longer periods of behavioral adjustment.

A careful analysis of NPS' projected imbalances and financial situation together with adequacy and equity considerations would be needed to design an appropriate AAM for Korea. In other words, considerations and trade-offs associated with parametric changes through AAMs are exactly the same as those faced under one-off reforms. Under the previous parametric reforms, the retirement age is set to increase, over time, to 65 by 2034. An increasingly popular AAM used in many OECD countries and could be adopted in Korea is linking retirement age to changes in life expectancy. This could allow retirement age to continuously adjust without being confined by a likely outdated ceiling (i.e., 65 years old), and yet allow sufficient lead time for various age cohorts to incorporate pension benefits in their retirement planning. It could also help minimize potential cross-cohort fairness issues retirement age reforms can bring about, for example by entitling less life-time average benefit payouts to newer retirees than the older ones.

**Figure 9. Illustrative Scenarios with AAMs: Retirement Age and Pension Duration**




Source: KOSIS; Authors' estimates.
1/ Example I illustrates an AAM focusing on maximizing pension fiscal sustainably.
2/ Retirement age applied to various age cohorts under the current system.
3/ Retirement age is adjusted according to the following: "life expectancy at 60 - retirement age = constant"; in this example the formula-based adjustment is applied from the age cohorts born in 1970.




Source: KOSIS; Authors' estimates.
1/ Example II illustrates an AAM focusing on maximizing intergenerational fairness.
2/ Retirement age applied to various age cohorts under the current system.
3/ Retirement age is adjusted according to the following: "life expectancy at 60 - retirement age = constant"; in this example the formula-based adjustment is applied from the age cohorts born in 1970.

To demonstrate how retirement age AAM can bolster NPS's fiscal sustainability, equalize pension benefits across generations, or both, we present pension duration profile across different age cohorts under different assumptions for the adjustment in retirement age (Figure 9).[16] Two intriguing observations emerge from here.

[16] The simulation is based on the 2013 life table compiled by Statistics Korea. We used a simple regression to transform life expectancy at birth in each year to residual life expectancy (RLE) at the age of 60 for the same year. The expected duration of pension is calculated by subtracting retirement age from RLE.

- There is clear scope for further reform in the NPS retirement age for both fiscal sustainability and inter-generational equity grounds. A phased increase in retirement age has already started in 2014. However, the pace of phasing (up to 65 years old to be applied to those born in or later than 1969) is expected to exceed the projected increase in life expectancy. As the result, the expected duration of life time pension benefits is poised to decrease over time, with 1969 vintage cohorts receiving 2.5 year less life-long pension compared to 1952 vintage ones. Afterwards, the expected pension duration will gradually rise again, putting fiscal pressure on the system and contributing to intergenerational inequity.

- While retirement age AAMs can address both fiscal sustainability and intergenerational fairness, there is an element of trade-off between the two goals:

    a. Example I showcases an AAM focusing on the former. It trails the current scheme of phased increase of retirement age until 2034 (when 1969 vintage cohorts retire at the age of 65). Then the automatic adjustment rule locks in the expected pension duration to be applied to later generations at 21.8 years, i.e., at its trough.[17] A simulation using our simple model indicates that a retirement age AAM like this will postpone the expected depletion of the NPS by 2–3 years.

    b. Example II essentially locks in the pension duration expected for the most recent retirees (i.e., 1956 vintage cohorts) to all subsequent generations. This is done by replacing the existing phasing scheme with a more gradual schedule that's aligned with projected path of life expectancy. Such a scheme would in fact worsen the fiscal position of the NPS, compared to the current scheme, until around 2060.[18]

    c. The choice of AAM should thus strike a right balance between the two objectives. It is also important to protect stability of the system, e.g., implicit or explicit contracts with the participants, as much as possible.

Other types of AAMs that reduce benefits or increase contribution rates would involve more difficult tradeoffs. Given that benefits have already been cut under previous reforms, future reductions in benefits could bring about pension adequacy issues and although Korea's contribution rate is relatively modest (Figure 5), contribution rates are rarely used for automatic adjustment given the broader ramifications and tax policy implications of automatically adjusting social security contribution rates.

[17] Although it sounds harsh, a scheme of this sort may not necessarily be politically unpalatable because it simply follows an already-agreed phasing-in scheme for the next two decades or so, and then activate a rule that appeals to both equity and sustainability,

[18] 2060 is the point at which this gradual adjustment based on this particularly AAM makes the retirement age exceed the one scheduled under the current scheme.

## C. China

In China, separate schemes provide old-age insurance for the salaried workers in the enterprise sector (UWS) and for the rest of non-salaried workers (Urban and Rural Residents, URR).[19] The pension system is fragmented both across schemes (UWS and URR are not integrated), and geographically (the central government provides guidelines and financing, but the schemes are administered at the provincial level).

- The Pension Scheme for UWS functions on a pay-as-you-go basis, funded by employee and employer contributions, but the central government is responsible for covering deficits. At retirement, benefits are the sum of a traditional defined benefit formula plus a defined contribution portion which in practice functions as a notional defined contribution pension. At retirement, after 35 years of contribution, a worker who is earning the average provincial wage would receive a pension slightly under 60 percent of the average provincial wage.[20] About 30 percent of the workforce currently contributes to these schemes and pensioners are about 40 percent of the population age 60 and older. Total expenditure is near 3 percent of GDP.

- The pension scheme for URR combines a funded, individual account component (intended to be fully financed by contributions), with a flat pay-as-you-go basic pension (financed by the state). The flat portion is set by law and remains relatively small at 2½ percent of the urban wage. About 40 percent of the workforce contributes to this scheme and 70 percent of the population age 60 and older receive basic pensions. Total expenditure in this scheme is about 0.3 percent of GDP.

Absent reforms, ageing is projected to increase public expenditure sharply over the next few decades. At near 3 percent of GDP current pension expenditure does not seem high relative to international comparators, but substantial pressures associated with ageing are expected ahead—the old age dependency ratio is projected to increase from 13 percent in 2015 to near 40 percent in 2050. Assuming the system parameters remain unchanged, pension expenditure is projected to increase by 5 percentage points of GDP in 2015–50. The combined deficits of the UWR and URR are projected to widen rapidly from 0.6 percent of GDP in 2015 to 5.8 percent of GDP in 2050. In present discounted value, the imbalance between expenditure and revenue over this period is estimated at 94 percent of 2015 GDP.

Increasing retirement ages is an attractive option to address the projected pension imbalances. China's retirement ages remain relatively low (55 years for women and 60 years

[19] The government also provides pensions to its employees, which are non-contributory. Expenditure is near 0.6 percent of GDP and benefit are roughly as generous as that in the UWR scheme.

[20]The first component provides a 35 percent replacement rate (0.5*35*provincial wage, 0.5*35*career wage). The notional defined contribution could provide up to 24 percent—assuming returns are equal to wage growth (which might be an optimistic assumption, since current rates generally follow the one-year bank deposit rate), an 8 percent contribution would generate a balance of 2.8 the average wage after 35 years, which divided by 139 (the annuity factor currently used) and multiplied by 12 months produces a pension of 24.17.

for men). Upon retirement men are expected to receive pensions for 18½ years and women for 25¾ years, substantially above the average expected years in retirement in the advanced economies. At the current statutory retirement ages, the expected years in retirement will increase due to improvements in life expectancy. By 2050, men are projected to receive benefits for 24 years and women for over 30 years.

Introducing AAMs for retirement ages would enhance sustainability, but might not be sufficient to eliminate the projected imbalances. Over 2015–50, life expectancy at age 60 is projected to increase by 5.3 years for men and 4.8 years for women. Implementing an AAM that links retirement ages to life expectancy would thus gradually raise retirement ages to 65 for men and 60 years for women. This would have an important impact in improving sustainability, but a large imbalance would remain—by just linking retirement ages to life expectancy, the projected pension system imbalance in 2015–50 goes from 94 to 72 percent of 2015 GDP.

**Table 4. Impact of Options to Restore Pension System Sustainability 2015–50**
(in percent of 2015 GDP)

| | |
|---|---|
| Pension imbalance (PDV of expenditure-revenue) | 94 |
| | |
| Impact of measures to restore balance | 91 |
| Automatic increse in retirement ages | 22 |
| Raise expected years in retirement to advanced economy averag | 30 |
| Change in indexation of benefits to price indexing | 31 |
| Reduce benefits by 5 percent | 8 |

More fundamental reforms are needed to fully address pension imbalances. Beyond AAMs, restoring sustainability would require a combination of other measures. These could include sharper increases in the retirement ages, particularly of women, to align the expected years in retirement with the advanced economies (increasing retirement ages for men and women to age 67 by 2050), modifying the indexing of pensions to price indexing, and changing benefit formulas to reduce average benefits by 5 percent (Table 3).

## V. Conclusions

Incorporating Automatic Adjustment Mechanisms (AAMs) can be a useful part of pension reforms in Asia. Asian economies are aging fast, and many will face rising financial imbalances in their pension systems, some earlier than others. The projected high pace of aging in many countries in the region requires urgent need to reform pension systems to restore financial sustainability. AAMs can increase the likelihood of parametric changes taking place with relatively limited political trade-offs. If implemented early, AAMs could help prevent the need for sharp adjustments in the future. In addition, they can increase the predictability and inter-generational equity of pension systems. AAMs can also be an

important signaling instrument, indicating policymakers' commitment to the pension system's long-term sustainability. This could enhance confidence and compliance.

A particularly important AAM for the region could involve linking retirement age to life expectancy or other system sustainability indicators. Pension systems in Asia do not yet feature automatic links between retirement age and life expectancy and expected years in retirement is typically higher in Asia than in other countries and regions. This provides important scope to use adjustments to retirement age to contain and reduce financial imbalances. In Japan, this could would reduce reliance on tax money and/or improve the replacement ratio while contributing to growth through increasing the labor supply. Introducing retirement age based AAMs would be particularly relevant for countries with already low replacement rates and would also be useful for several countries in the region with defined contribution schemes in improving the adequacy of their systems.

AAMs are not meant to be a silver bullet. They can help slow down the accumulation of unfunded liabilities related to demographic and macroeconomic changes but their aim is not to fix pension systems that have large unfunded liabilities. In those cases, more fundamental reforms may need to be implemented and at that point AAMs can ensure that the system remains sustainable going forward. The experience of Japan with its AAM suggests that it was helpful in preventing further increases in financial imbalances, but there is room for improving its effectiveness and credibility through using more prudent assumptions in evaluating the soundness of pension finances and making the "macroeconomic indexing" work better under a low price/wage inflation or deflation environment.

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## APPENDIX: SELECTED COUNTRY CASES WITH AAMS

### ***Adjustment of Benefit Levels***

Bosnia-Herzegovina

In response to chronic cash shortages, both of the confederated entities of the country introduced a strict benefit rationing regime in the 2001. The rules (imposed by the UN-appointed high representative) stipulated that a bracket of the pension benefit roughly corresponding to the subsistence minimum is protected and should enjoy preference when allocating contribution revenue. Remaining pension obligations (corresponding to the benefit portion over and beyond the subsistence minimum) were pro-rated to the remaining revenues. The adjustments were executed on a monthly basis and unpaid pensions were not accounted as arrears. The system, while notionally operational, is cautionary tale in the over-ambitious application of the AAMs and ABMs: instead of subjecting pensioners to volatility in terms of benefit levels, both entity government went to great length to convince enterprises to pay up their contribution arrears which accrued over the preceding years – and then compensated the same enterprises through various tax easement and budget subsidies. Thus, the extremely strict AAM eventually did not help either to increase transparency or sustainability – instead, it forced the government to continue subsidizing public pension funds in an even more nontransparent manner

Finland

From 2010, new earnings-related pensions are reduced in line with improvements in life expectancy at retirement. The life expectancy coefficient is calculated at age 62, and is compared to that in 2009. The adjustment is expected to result in benefit reductions of 20 percent by 2050, keeping all other assumptions and policies unchanged. Finland also legislated an increase of the retirement age to 65 – after which further increases will be determined by improvements in life expectancy.

Japan

Japan has introduced an AAM in 2004 but has only activated in in 2015. The "macroeconomic indexing" reflects changes in the number of the insured and the average longevity. The indexing allows the pension benefits to be reduced in real terms but pension benefits cannot be cut in nominal terms. If the replacement ratio is projected to drop below 50 percent in the quinquennial re-examination of pension finances, additional reform measures are called for.

Latvia and Poland

Both Latvia and Poland reformed their social security pension schemes along the Swedish example of Notional Defined Contributions (NDC). As described in the body of the paper,

NDC schemes, among other adjustment mechanisms linked to the performance of the economy as a whole and reflected in the notional returns credited to individual accounts, also adjust benefit levels to life expectancy at retirement. This mechanism is similar to that applied for commercially underwritten annuities, and is based on statistical life tables as well as the requirement to equate the present value of the expected benefit stream with the value of the notional account at retirement.

Russia

Russia replaced its NDC system with a point system as of January 2015. Points are generated by dividing covered earnings with the economy-wide average wage, while point values are calculated along an automatism: by the higher of (a) indexing the previous year's point value to CPI or (b) dividing Pension Fund revenues (including budget subsidies) by the total points in the system. The similarity to the German system is in applying the same valorization to the point value of new and existing retirees, while a major dissimilarity is that pension fund revenues which automatically drive the indexation of point values include budget subsidies – thus, while establishing the value of points appears to follow an automatism, it can be influenced directly by the government.

Sweden

The most important AAM in the Swedish NDC system is the annuity divisor which translates (notional) individual balances into monthly benefits on the basis of cohort-specific life expectancies. The mortality information is regularly updated, reflected in the divisor and communicated to members so that they can adjust their retirement decisions accordingly. In addition to the annuity divisor – which is an AAM – the system also has automatic balancing mechanism: every year, the scheme's balance sheet is compiled and if unfunded liabilities emerge, both the notional returns credited to individual accounts and the rate of benefit indexation is automatically reduced until the funding gap is closed.

United States

In addition to various parametric reforms and the recurring discussion of a structural reform, the US Social Security legislation also includes an AAM. Its trigger is the depletion of the US Social Security Trust Fund: Social Security is prohibited to borrow. Thus, from the time the trust fund is depleted, pension benefits will need to be adjusted downward immediately – according to some estimates by as much as 30 percent – and, in effect, be prorated to contribution revenues. This ultimate – and politically unfathomable – threat was incorporated into the legislation to make sure that it need not be applied and, instead, legislators introduce more gradual adjustments in time. Thus, the strong AAM of the law is expected to trigger a weaker, institutional-procedural AAM

Germany and Spain adjust both benefit levels and the contribution rates (Germany) or retirement ages (Spain) – see below.

***Adjustment of Contribution Rates***

Canada

Canada is one of only two countries (the other being Sweden) with automatic adjustments explicitly triggered by long-term sustainability considerations. Every three years, there is a review of the financial sustainability of the public, earnings-related scheme. The scheme is partially funded – in other words, the reserves are not intended to offset the scheme's liabilities but to help smoothing the required contribution rate and to provide a buffer when baby boom cohorts retire. Canada is also unique in two more ways: on hand, the variable responding to imbalances is the contribution rate: if the legislated rate is below rate required for the scheme's sustainability, it is the contribution rate which is expected to adjust. On the other hand, the projected imbalances first trigger a call on provincial ministers to agree on an alternative solution and the contribution rate increase only goes into effect is ministers fail to act. Canada also splits the burden of adjustments, in a manner somewhat similar to Germany: if contribution rate increases are introduced, benefit indexation is also suspended for three years (until the next actuarial study). This provision places even greater pressure on government to find a solution other than contribution rate increases.

Germany

Germany's earnings-related public pension scheme has been operating a point system for over fifty years and has served as the model for other countries. The points earned in a year are the result of dividing the individual's insurable earnings with the economy-wide average wage. At retirement, the points earned are multiplied by the point value established for the given year. The point value is annually indexed to wage growth but is also adjusted (downward) by a contribution factor (reflecting necessary contribution rate increases) and a sustainability factor, based on improvements in longevity. The index thus arrived at is uniformly applied to new pensions and benefits already in service (functioning as a benefit indexation rule, in effect). The contribution factor is an interesting feature of the system. If contribution rates need to be increased (to maintain the system's short- to medium-term solvency and to honor the legally established, permanent share of budget subsidies to the scheme), the contribution factor of the formula ensures that the additional financial burden is also shared by pensioners: if contribution rates need to increase, pension benefits must decline, too, in a manner ensuring that 25 percent of the adjustment is borne by pensioners and 75 percent by contributors

***Adjusting Retirement Ages and Qualifying Service Time***

Czech Republic

After the current retirement age increase is completed (at 65 for both men and women) in 2030, the retirement age will continue increasing automatically, at a rate of 2 months per year, in line with projected improvements in life expectancy at retirement.

France

France has taken a unique approach to tightening eligibility conditions and thereby influencing workers' retirement decisions. In addition to gradually increasing retirement ages (although not linking it to life expectancy or making it automatic in any other way), the other major eligibility condition – the minimum qualifying service time needed for a full pension – will automatically increase in line with life expectancy. The purpose of this AAM is to keep the ratio of the period of benefit receipt to that of working and contributing constant. In addition, the "cost of a point" and point value factors in the country's social security point system are established in accordance with time-bound agreements (as opposed to annual re-negotiations). The agreement which expired at the end of 2012, for instance, required upscaling the cost of points in line with wages and the point value in line with prices. Thus, during the applicability of that agreement, the points earned reflected relative contribution performance not only across individuals but from year to year, too.

Greece

In addition to various ad-hoc and systematic measures aiming at reducing the social security system's imbalances, Greece also introduces life expectancy adjusted retirement age increases, commencing in 2021.

Norway

Norway introduced two measures, both automatic and both conditioned on changes in life expectancy. On one hand, from 2011 retirement ages are flexible but observe actuarial neutrality – which by definition, implies adjustments to life expectancy at retirement. On the other hand, the normal retirement age, at which pensions can be claimed without either actuarial deductions or increments will be adjusted to life expectancy.

Portugal

Portugal also introduced an AAM which ensures that new pensions reflect the changes in life expectancy at 65, measured between 2006 and the year of retirement.

Spain

In order to address the long-term sustainability issues of its social security system, Spain introduced parametric reforms in 2011: retirement age increases and an extension of the wage histories counting into the pension formula. In addition, Spain also introduced, in 2013, an Automatic Balancing Mechanism. The ABM has three elements: (a) starting from 2019, new benefits will be calculated with life expectancy changes taken into consideration; (b) from 2027 on, indexation of pensions already payment will no longer be linked to prices but to prices and the financial position of the pension system; (c) a lower (-2.25 percent) and upper (+0.5 percent) limit on the sustainability adjustment of pension indexation.