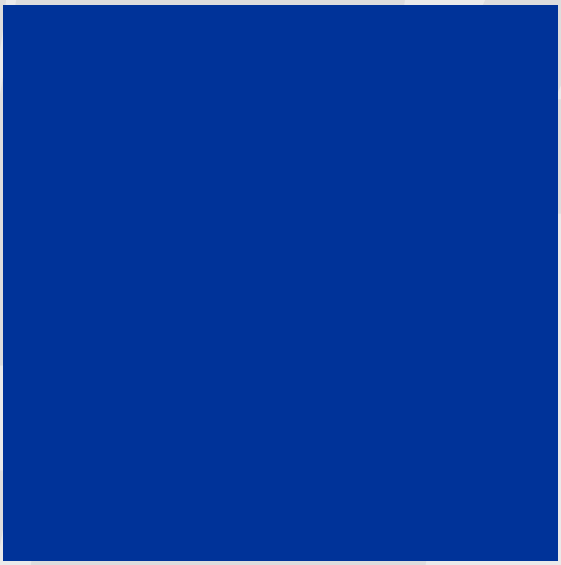
BEITRÄGE ZUR SOZIALEN SICHERHEIT

Towards Financial Sustainability Of Pension Systems

The Role Of Automatic-Adjustment Mechanisms in OECD and EU Countries

Forschungsbericht Nr. 8/12



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Vorwort des Bundesamtes für Sozialversicherungen

Die demographische Alterung der Bevölkerung, verursacht durch die stetig steigende Lebenserwartung im Rentenalter bei einer nahezu gleichbleibenden Anzahl Erwerbstätiger, setzt die meisten Altersvorsorgesysteme unter Druck. Anpassungen zur Erhaltung der finanziellen Tragfähigkeit sind unumgänglich und nicht immer leicht durchzusetzen. Im Rahmen der Vorbereitungsarbeiten zur nächsten Reform der Altersvorsorge wurde deshalb eine Studie in Auftrag gegeben, die die Anforderungen und Möglichkeiten automatischer Anpassungsmechanismen analysieren sollte. Zudem waren anhand eines internationalen Vergleichs die Umsetzungsmöglichkeiten und die Erfahrungen mit automatischen Anpassungsmechanismen zu prüfen.

Die Autoren legen dar, dass finanzielle Nachhaltigkeit im Prinzip als langfristiges aktuarisches Gleichgewicht definiert werden kann: Die (erwartete) Summe der Beiträge und weiterer Einnahmen sollten über einen Zeitraum von mindestens 50 bis 75 Jahren den (erwarteten) Rentenleistungen entsprechen. Dies kann als Zielgrösse für einen automatischen Anpassungsmechanismus festgelegt werden. Als Instrumente stehen alle Parameter des Altersvorsorgesystems zur Verfügung. So können sowohl die Einnahmen, die Rentenformel zur Berechnung der Anfangsrente und zur Rentenanpassung oder das Rentenalter mit einem demografischen Steuerungsfaktor, wie z.B. der Lebenserwartung oder dem Altersquotienten (Verhältnis des Anteils der Rentenbeziehenden zu jenem der Aktiven), verknüpft werden. Auch ein separater Reservefonds ist denkbar, der mit (zusätzlichen) Beiträgen geäufnet wird, während die geburtenstarken Jahrgänge erwerbstätig sind, und dann zur Überbrückung von Defiziten eingesetzt wird, wenn diese in den Ruhestand gehen.

Automatische Anpassungsmechanismen haben den grossen Vorteil, dass die notwendigen Massnahmen zum Erhalt des finanziellen Gleichgewichts auf die vereinbarte Weise umgesetzt werden können, ohne dass weitere politische Entscheide notwendig werden. Die Autoren der Studie weisen jedoch darauf hin, dass die Wirkung und die Wirksamkeit der Anpassungsmechanismen von weiteren Faktoren abhängig sind. So ist zunächst zu überlegen, ob der Mechanismus als langfristige Präventionsmassnahme oder zur Behandlung einer bereits eingetretenen Krisensituation eingesetzt werden soll. Weiter ist zu berücksichtigen, dass ein plötzlicher Einbruch der Wirtschaft einen automatischen Mechanismus, der auf einen langfristigen Ausgleich angelegt ist, aus dem Gleichgewicht bringen kann. Schliesslich sind bei der Konzipierung der Mechanismen immer auch die „Nebenwirkungen“ auf dem Arbeitsmarkt oder bei anderen Sozialversicherungen zu berücksichtigen.

Die Autoren haben festgestellt, dass es nur sehr wenigen Ländern tatsächlich gelungen ist, die genannten Instrumente mit demografischen Steuerungsfaktoren zu verknüpfen und einen automatischen Anpassungsmechanismus in Kraft zu setzen. Dies liegt auch daran, dass solche Mechanismen auf politischer Ebene jeweils kurz vor der Anwendung geändert oder gestoppt worden sind.

Mit dem bisher verwendeten Mechanismus zur Anpassung der AHV-Renten an die wirtschaftliche Entwicklung hat die Schweiz seit über 30 Jahren gute Erfahrungen gemacht. Die gewählte Methode mit dem Mittelwert von Lohn- und Preisindex hat auch einen wesentlichen Teil zur finanziellen Stabilität der AHV beigetragen. Sind die längerfristigen Ziele zur Rentenhöhe und deren Finanzierung für die nächste AHV-Revision einmal festgelegt, so können dazu auch die passenden Massnahmen bestimmt werden. Ein geeigneter Anpassungsmechanismus könnte dann für die Einhaltung dieser Ziele sorgen.

Werner Gredig, Vizedirektor
Leiter Geschäftsfeld Mathematik, Analysen, Statistiken

Avant-propos de l'Office fédéral des assurances sociales

Le vieillissement de la population, résultant de l'augmentation constante de l'espérance de vie à l'âge de la retraite et de la stagnation du nombre d'actifs, met sous pression la plupart des systèmes de prévoyance vieillesse. Pour garantir la capacité de financement, des ajustements, bien que souvent difficiles à mettre en œuvre, sont inévitables. Dans le cadre des travaux préparatoires pour la prochaine réforme de la prévoyance vieillesse, une étude a été commandée dans le but d'analyser les mécanismes d'ajustement automatique envisageables et les conditions requises pour leur mise en place. Elle visait également à étudier, sur la base d'une comparaison internationale, les diverses modalités de leur mise en œuvre et les expériences réalisées avec ce type de mécanismes.

Les auteurs de l'étude expliquent que la viabilité financière peut en principe être définie comme un équilibre actuariel à long terme. Autrement dit, le volume (attendu) des cotisations et d'autres revenus devrait correspondre sur une période de 50 à 75 ans aux prestations (attendues) du système de retraite. Défini ainsi, cet équilibre peut constituer la valeur-cible à poursuivre dans le cadre d'un mécanisme d'ajustement automatique. Tous les paramètres du système de prévoyance vieillesse peuvent servir d'outils pour atteindre cet objectif. On peut ainsi combiner les revenus, les formules de calcul de la rente de départ et de l'ajustement des rentes ainsi que l'âge de la retraite à un facteur démographique tel que l'espérance de vie ou le rapport de dépendance (rapport entre le nombre de retraités et le nombre d'actifs). Il est également envisageable d'avoir recours à un fonds de réserve, alimenté par des cotisations (supplémentaires) lorsque les classes d'âge des années à forte natalité sont actives, pour pallier les déficits lorsque ces mêmes classes d'âge prennent leur retraite.

Les mécanismes d'ajustement automatique présentent le grand avantage qu'ils permettent d'appliquer tel que convenu les mesures nécessaires pour préserver l'équilibre financier sans qu'il y ait besoin de décisions politiques supplémentaires. Les auteurs de l'étude indiquent toutefois que l'effet et l'efficacité des mécanismes d'ajustement dépendent également d'autres facteurs. Ainsi, il faut tout d'abord établir si de tels mécanismes sont prévus à titre de mesures préventives à long terme ou en réponse à une situation de crise déjà déclarée. Il faut également tenir compte du fait qu'une baisse subite de l'activité économique peut déstabiliser un mécanisme automatique conçu dans la perspective d'un équilibre à long terme. Enfin, lors de la conception de ces mécanismes, il faut considérer les « effets secondaires » qu'ils entraîneront sur le marché du travail ou sur les autres assurances sociales.

Les auteurs ont observé que seuls très peu de pays sont parvenus à combiner les outils mentionnés avec les facteurs démographiques et à mettre en place un mécanisme d'ajustement automatique. Cette situation résulte également du fait que la mise en œuvre de ces mécanismes a toujours été modifiée ou suspendue au niveau politique juste avant qu'ils ne s'activent.

Depuis plus de 30 ans, le mécanisme d'ajustement des rentes AVS à l'évolution de l'économie fait ses preuves en Suisse. La méthode choisie, se basant sur l'indice des salaires et l'indice des prix, a aussi contribué en grande partie à la stabilité financière de l'AVS. Dès que les objectifs à plus long terme concernant le montant des rentes ainsi que leur financement dans le cadre de la prochaine révision de l'AVS seront fixés, les mesures adéquates pourront êtres définies. Un mécanisme d'ajustement adapté pourrait alors permettre de répondre à ces objectifs.

Werner Gredig, vice-directeur
Chef du domaine Mathématiques, analyses et statistiques

Premessa dell’Ufficio federale delle assicurazioni sociali

L'evoluzione demografica, il basso tasso di natalità e la continua crescita dell'aspettativa di vita mettono sotto pressione quasi tutti i sistemi di previdenza per la vecchiaia. Risulta dunque indispensabile, ma non sempre di facile attuazione, operare alcuni adeguamenti per mantenerne la sostenibilità finanziaria. Per questo motivo, nel quadro dei preparativi per la prossima riforma della previdenza per la vecchiaia è stato commissionato uno studio con l'obiettivo di analizzare i possibili meccanismi di adeguamento automatico e i loro requisiti. Mediante un confronto internazionale si sono inoltre esaminate le possibilità d'attuazione e le esperienze maturate in questo campo.

Secondo gli autori della ricerca, la sostenibilità finanziaria può essere definita, in linea di massima, come una situazione di equilibrio attuariale a lungo termine: sull'arco di almeno 50 fino a 75 anni la somma prevista dei contributi e di altre entrate dovrebbe corrispondere alle prestazioni pensionistiche attese. Questo equilibrio può essere fissato quale obiettivo di un eventuale meccanismo di adeguamento automatico. Tutti i parametri del sistema previdenziale possono fungere da strumenti per raggiungerlo: è possibile collegare le entrate, la formula di calcolo delle rendite iniziali e degli adeguamenti delle medesime o l'età pensionabile con un fattore demografico determinante, come per esempio l'aspettativa di vita o la quota degli anziani (rapporto tra beneficiari di rendite e persone attive). Oppure può essere istituito un fondo di riserva separato, costituito con contributi (supplementari) negli anni di attività delle generazioni numerose e utilizzato successivamente per coprire i disavanzi creatisi in seguito al pensionamento delle medesime.

Il grande vantaggio dei meccanismi di adeguamento automatico consiste nel fatto che, una volta trovato un accordo sul tipo di adeguamento automatico da introdurre, essi sono sottratti all'influenza politica a breve termine e possono essere attuati nel modo convenuto. Gli autori dello studio precisano tuttavia che il loro effetto e la loro efficacia dipendono da ulteriori fattori: occorre considerare in primo luogo se il meccanismo scelto debba servire come misura preventiva a lungo termine o per rimediare a una situazione di crisi già in corso. In secondo luogo va tenuto conto del fatto che un meccanismo automatico volto a mantenere l'equilibrio del sistema nel lungo periodo può essere compromesso da un'improvvisa contrazione dell'economia. Nella messa a punto dei meccanismi, infine, non vanno trascurati neanche gli "effetti collaterali" sul mercato del lavoro o sulle altre assicurazioni sociali.

Gli autori hanno rilevato che solo pochissimi Paesi sono riusciti a mettere in vigore un meccanismo di adeguamento automatico collegando gli strumenti citati con fattori demografici determinanti. Ciò è dovuto, da una parte, alla forte pressione esercitata da diversi gruppi d'interesse quando si tratta di adeguare la previdenza per la vecchiaia; dall'altra parte, è emerso che l'attuazione di tali meccanismi viene spesso modificata o sospesa dagli ambienti politici proprio quando essi iniziano a esplicare i loro effetti.

La Svizzera può trarre un bilancio positivo dalla sua esperienza ultratrentennale con il meccanismo di adeguamento automatico delle rendite AVS all'evoluzione economica del Paese. Il metodo prescelto della media fra indice dei salari e indice dei prezzi al consumo ha contribuito in modo sostanziale alla stabilità dell'AVS. Non appena, nell'ambito della prossima revisione dell'AVS, saranno fissati gli obiettivi a lungo termine riguardo al livello delle rendite e al loro finanziamento, si potranno anche definire le misure da adottare. Un meccanismo di adeguamento opportuno potrebbe essere la soluzione giusta per garantire il raggiungimento di tali obiettivi.

Werner Gredig, vicedirettore
Responsabile Ambito matematica, analisi e statistica

Foreword of the Federal Social Insurance Office

Demographic trends, low birth rates and constantly rising life expectancy are putting pressure on most old-age pension systems. Although systemic changes are essential in the interests of financial sustainability, they are not always easy to push through. Therefore, a study was commissioned as part of the preparatory work being carried out ahead of the next revision of the pensions system to analyse the requirements for automatic adjustment mechanisms and the possibilities such mechanisms offer. A further goal of the study was to examine the implementation options for automatic adjustment mechanisms and the experience gained with mechanisms in other countries.

The authors of the study argue that, in principle, financial sustainability can be defined as the long-term actuarial equilibrium: the – expected – sum of the contributions and other income should, over a period of at least 50 to 75 years, correspond to the – expected – pension benefits. This can be set as the target of an automatic adjustment mechanism. All the parameters of the pension system can serve as instruments to achieve this goal. It is possible, for instance, to link income, the formulae for calculating the initial pension and for adjusting the pension or the retirement age to a demographic control factor, such as life expectancy or the pensioner ratio (proportion of people drawing pensions to those actively insured). It is also conceivable to set up a separate reserve fund using (additional) contributions while the baby boomers are still gainfully employed, and to use it to cover the deficits that arise after they retire.

A big advantage of automatic adjustment mechanisms is that, once they have been agreed upon, they are immune to short-term political influence, and the necessary measures can be implemented in the agreed manner. However, the authors of the study point out that the efficacy of the adjustment mechanisms depends on other factors as well. It is necessary to consider, for example, whether the mechanism is to be deployed as a long-term preventive measure or to counter a crisis situation that has arisen. In addition, we need to take account of the fact that a sudden economic slump can disrupt an automatic mechanism that was intended to compensate a certain effect in the long term. Finally, when designing mechanisms, we need to consider the “side effects” they may have on the employment market or other social insurance schemes.

The authors have established that only very few countries have actually succeeded in linking the above-mentioned instruments to demographic control factors and enacting an automatic adjustment mechanism. One reason for this is that various interest groups exert considerable pressure in pension-related matters; another is the fact that, at political level, the implementation of such mechanisms is often altered or stopped just as they are about to be triggered.

Switzerland has been successfully using the mechanism to adjust AHV pensions in line with economic developments for more than 30 years. The chosen method based on the wage and price index has also contributed significantly to the financial stability of the AHV. Once the longer-term objectives have been defined for pension levels and their funding for the next AHV amendment, it is possible to identify the appropriate measures. A suitable adjustment mechanism could then ensure that these objectives are observed.

Werner Gredig, Vice-Director
Head of Mathematics, Analyses and Statistics

Zusammenfassung

Die praktisch ununterbrochen steigende Lebenserwartung in den entwickelten Ländern stellt nicht nur die Politik sondern gerade auch die Rentensysteme vor grosse Herausforderungen. Die steigende Lebenserwartung hat viele Länder in den letzten 15 Jahren dazu bewogen, die Renteneinkommenssysteme *automatisch* an die demografischen und finanzwirtschaftlichen Entwicklungen zu binden.

Diese wichtige Neuerung ist aus wirtschaftlichen wie auch politischen Gründen attraktiv. Theoretisch bedeutet die Automatisierung der Rentenparameter nämlich, die Finanzierung der Renten bis zu einem gewissen Ausmass gegen demografische und wirtschaftliche Einflüsse zu immunisieren. Gleichzeitig wird dem System damit ein nachvollziehbarer und klar abgegrenzter Rahmen für Änderungen verpasst, zum Beispiel Leistungskürzungen, die politisch nur schwierig und bruchstückhaft durchzusetzen wären. Wie bei anderen Mechanismen der Mittelvorbindung in der Wirtschaftspolitik, beispielsweise geld- und fiskalpolitische Strategien, sollen diese auch hier für Glaubwürdigkeit sorgen und Sicherheit dafür bieten, dass die öffentlichen Finanzen künftig nicht durch unerwartete Entwicklungen der öffentlichen Altersvorsorgesysteme belastet werden. Die Sicherung der finanziellen Nachhaltigkeit von Altersvorsorgesystemen ist im aktuellen ökonomischen Kontext zur noch dringlicheren Aufgabe geworden. In diesem Bericht soll aufgezeigt werden, welche Arten automatischer Anpassungsmechanismen für öffentliche Rentensysteme in den OECD-Ländern in Frage kommen oder bereits eingesetzt werden.

Den Anfang machen Untersuchungen verschiedener Konzepte finanzieller Nachhaltigkeit (Abschnitt 2). Zuerst betrachten wir ein statisches Konzept (PAYG Gleichgewicht). Danach ein dynamisches Konzept (versicherungstechnisches Gleichgewicht).

In Abschnitt 3 werden die unterschiedlichen Instrumente zur Koppelung von Rentensystemen an demografische und wirtschaftliche Veränderungen im Hinblick auf finanzielle Nachhaltigkeit der öffentlichen Rentensysteme aufgeführt. Dabei stehen vier Instrumentarien im Vordergrund, die in einigen OECD- und EU-Ländern bereits eingesetzt worden sind:

(i) Anpassen der Leistungen (bzw. der Höhe der Rentenleistungen), was sich direkt ausgabensenkend auswirkt;

(ii) Anpassen der Renteneintrittsalter, was sich einerseits als ausgabensenkend auswirkt, da die Dauer des Rentenbezugs verkürzt wird, und andererseits als einnahmensteigernd, da länger einbezahlt wird;

(iii) Anpassen der Beitragssätze, was die Einnahmen erhöht;

(iv) Bezüge aus einem Reservefond, falls einer vorhanden ist.

Die ersten drei Instrumente sowie deren Umsetzung werden in Abschnitt 4 genauer beschrieben, während in Abschnitt 5 die Reservefonds behandelt werden.

In Abschnitt 4 wird untersucht, wie Anpassungen der Rentenleistungen, des Renteneintrittsalters und der Beitragssätze umzusetzen sind.

Die Anpassung der Rentenhöhe ist das am häufigsten verwendete Instrument und erfolgt meist durch indirekte Veränderungen der Leistungsberechnungsformel. In der Praxis hängen die Leistungsanpassungsfaktoren häufig vom Verhalten einiger demografischer Indikatoren (z.B. Lebenserwartung und Altersquotient) oder von ökonomischen Einflussgrössen ab (z.B. Zunahme des BIP oder der durchschnittlichen Einkommen).

Jedoch sind nur einige dieser indirekten Ansätze als **automatische Anpassungsmechanismen** zu betrachten. Effektiv gibt es **drei hauptsächliche automatische Anpassungsmechanismen** zum Verändern von Rentenwerten.

- Erstens: Es können Anpassungen des Betrages der ausgerichteten Renten erfolgen, um auf Veränderungen der **Lebenserwartung** zu reagieren.
- Zweitens: Anpassungen können durch die **Valorisierung** von in früheren Jahren erzielten Einkommen erfolgen.
- Drittens: Anpassungen können durch eine **Indexierung** der Rentenzahlungen erfolgen.

Was öffentliche Rentensysteme anbelangt, so werden lebenserwartungsabhängige Anpassungen der ausbezahlten Renten in einigen leistungsbasierten Systemen (z.B. Portugal und Finnland) direkt oder auf beitragsorientierter Basis (Italien, Lettland, Norwegen, Polen und Schweden) umgesetzt.

Was das Aufwertungsverfahren anbelangt, das eingesetzt wird, um die Veränderungen der Kosten und des Lebensstandards im Zeitraum zwischen Beitragsbeginn und der Inanspruchnahme der Rente miteinzubeziehen, so wirkt sich dieses Verfahren erheblich auf die Renteneinkommen aus. In Japan wird dieses Verfahren als automatischer Anpassungsmechanismus verwendet. Nach der Reform im Jahr 2004 wurde die Valorisierung der Entwicklung der aktiven Beitragszahler angepasst.

In einigen Fällen besteht eine Verbindung zwischen Aufwertung (d.h. Vorruhestandsindexierung) und Nachruhestandsindexierung. Obwohl die Indexierung allgemein eingesetzt wird, ist sie nur in wenigen OECD-Ländern (Kanada, Deutschland, Japan, Portugal und Schweden) explizit an die Nachhaltigkeit des Systems gekoppelt. So wird beispielsweise in Kanada bei steigenden Beitragssätzen die Indexierung der Rentenauszahlungen für drei Jahre eingefroren, bis zur Veröffentlichung des nächsten Versicherungsberichts und Neubewertung des Altersvorsorgeplans. In Schweden werden die Renten zusätzlich zur Koppelung der Rentenberechnungen an die Lebenserwartung auch noch indexiert, und damit versucht, die Solvenz des Systems aufrecht zu erhalten.

Immer mehr OCED-Länder erhöhen das Ruhestandsalter. So hat bereits über die Hälfte der OECD-Länder das Alter in staatlichen Rentensystemen heraufgesetzt. In den meisten Fällen ist davon auszugehen, dass die Erhöhungen im Rahmen von gesetzlichen Bestimmungen erfolgen. Die ordentlichen Renteneintrittsalter werden sich in den OECD-Ländern nach den Reformen zwischen 60 und 68 Jahren bewegen oder teilweise gar darüber liegen und durchschnittlich 65,2 Jahre betragen. Diese Massnahme zielt sowohl auf die nötige Beitragsdauer als auch auf den Leistungszeitraum ab. Die Anbindung des Rentenalters an die Lebenserwartung sollte folglich mindestens so sinnvoll erscheinen wie die Beitragsgebundenheit. Doch verfügen nur wenige OECD-Länder über eine solche Koppelung in ihren Altersvorsorgesystemen. Einzig Dänemark, nach der Erhöhung des Rentenalters auf 67, verfügt über Vorkehrungen, die es ermöglichen, die Indexierung des Renteneintrittsalters an höhere Lebenserwartungswerte zu binden. Die Bedingung dabei ist, dass Rentenalterserhöhungen immer zuerst vom dänischen Parlament verabschiedet werden. Die Anhebung wird letztlich anhand der Lebenserwartungswerte in Fünfjahresabschnitten, beginnend im Jahr 2015, ermittelt. Griechenland und Italien werden das Rentenalter ab 2021 bzw. 2013 nach Lebenserwartung indexieren.

Beitragssätze werden selten als automatische Stabilisierungsfaktoren verwendet und viele der in den vergangenen Jahren unternommenen diesbezüglichen Massnahmen zielten hauptsächlich auf eine Stabilisierung der Sätze ab. Dennoch wird dieses Instrument in Kanada und Deutschland eingesetzt. In Kanada werden die Beitragssätze unter zwei Bedingungen erhöht: (i) Der Versicherungsbericht zum kanadischen Altersvorsorgeplan zeigt, dass der gesetzliche Satz unter dem nötigen Mindestbeitragssatz für die Nachhaltigkeit des Systems liegt; und (ii) die Bundesminister und Minister der Provinzen können sich nicht auf eine andere Lösung einigen. In

Deutschland kommt der Nachhaltigkeitsfaktor nicht nur für die Indexierung der anfänglichen Beiträge sondern auch für die Anhebung der Beitragssätze zum Tragen.

Die Verwendung eines Reservefonds wird in Abschnitt 5 behandelt. Es wird ersichtlich, dass die Hälfte der OECD-Länder öffentliche Altersvorsorgereserven aufgebaut haben, die helfen sollen, die staatlichen Renten in Zukunft zu bezahlen. In diesen Ländern beliefen sich die öffentlichen Altersvorsorgereserven im Jahr 2009 auf durchschnittlich knapp 10% des BIP, was etwa US$ 5‘400 Milliarden entspricht. Diese Art der "Vorfinanzierung" von künftigen Rentenausgaben mit öffentlichen Reserven soll verhindern, dass die Beitragssätze künftig zu stark ansteigen. Zudem soll eine Schlechterstellung breiter Rentnergruppen (z.B. die so genannte Generation der Babyboomer) verhindert werden, und drittens will man vermeiden, dass die Renten aus beitragsbasierten PAYG-Vorsorgemodellen massiv gekürzt werden, was nötig wäre, um eine ausgeglichene Bilanz aufrecht zu erhalten, wenn beispielsweise die Beitragssätze nicht angehoben würden.

Die automatischen Steuerungsmechanismen werden in Abschnitt 6 dargelegt und erklärt, wie solche Mechanismen effektiv in der Praxis funktionieren. Es ist anscheinend nur sehr wenigen Ländern gelungen, die verschiedenen erwähnten Möglichkeiten automatischer Anpassungen der Vorsorgesysteme zu kombinieren. Dass es nicht gelingt, ein umfassendes System an Mechanismen in Gang zu setzen, kann verschiedene Gründe haben. Der Druck der Interessengruppen und die Normen welche die Anwartschaften auf Leistungen regeln, können beispielsweise die Ausarbeitung und die Funktionsweise solcher Mechanismen überlagern.

Zudem wird möglicherweise nach der Ankündigung einer beabsichtigten Einführung solcher Mechanismen auf politischer Ebene entschieden, dass die Umsetzung gestoppt oder geändert wird.

Letztlich zeitigt die Wahl der in diesem Bericht dargestellten Instrumentarien folgenschwere Auswirkungen, ziehen sie doch tiefgreifende Angleichungen mit anderen Zielsetzungen des Altersvorsorgesystems nach sich. Zum Beispiel Kürzungen, die nötig werden, um einen finanzwirtschaftlichen Ausgleich zu erzielen, und die durch den Anpassungsmechanismus ausgelöst werden und letztlich zu Renten führen, die zu tief sind, um davon leben zu können. Zusätzliche Ausgaben für Leistungen aus Sicherheitsnetzen kann einen Grossteil anderweitig angesammelter Ersparnisse wieder auffressen. Auch kann sich die Anhebung des Rentenalters im Bemühen um eine längere Lebensarbeitszeit allein als unzureichend erweisen, wenn ältere Menschen bei der Arbeitssuche und Arbeitsstellenerhaltung auf andere Hindernisse (zum Beispiel auf der Nachfrageseite) stossen (siehe D'Addio *et al.* 2010).

Es ist deshalb wichtig, sich nicht nur auf finanzielle Nachhaltigkeit und die Mittel und Wege, diese zu erreichen, zu konzentrieren, sondern auch auf die Adäquanz der Leistungen und damit auf die soziale Nachhaltigkeit von Altersvorsorgesystemen. Es gilt, einen Ausgleich zwischen finanzwirtschaftlichen und versicherungstechnischen Aspekten anzustreben und Richtlinien bzw. Grundsätze zu verfolgen, die es ermöglichen, Leistungen auf angemessener Höhe beizubehalten. Dennoch können automatische Anpassungsmechanismen den einzelnen helfen, proaktiv zu handeln und ihre Spar- und Arbeitsverhalten anzupassen, wenn die Mechanismen so konstruiert sind und umgesetzt werden, dass Änderungen allmählich erfolgen, dass Transparenz herrscht und die Bürde gerecht auf die Generationen verteilt wird.

Résumé

L'augmentation quasi continue de l'espérance de vie dans les pays développés constitue un défi pour les politiques publiques en général et pour les systèmes de retraite en particulier. Ces évolutions ont conduit de nombreux pays à introduire, au cours des quinze dernières années, un lien *automatique* entre l'évolution démographique et financière, d'une part, et le système de retraite, d'autre part.

Cette innovation est intéressante pour des raisons à la fois économiques et politiques. Automatiser l'ajustement des paramètres du régime de retraite revient théoriquement à protéger son financement de brusques variations démographiques et économiques. Des réformes qui seraient politiquement difficiles à introduire au coup par coup – une réduction des prestations, par ex. – peuvent ainsi s'inscrire dans un cadre logique et bien défini. Comme d'autres mécanismes d'engagement préalable en matière de politique économique – dans la politique monétaire et fiscale, par ex. –, sa fonction est de renforcer la crédibilité des régimes publics de retraite et de garantir que ces derniers ne viendront pas grever les finances publiques de façon inattendue. Assurer la viabilité financière des régimes de retraite est devenu un défi encore plus urgent dans le contexte économique actuel. Le présent rapport examine quels types de mécanismes d'ajustement automatique sont ou pourraient être utilisés dans les systèmes publics de retraite des pays de l'OCDE.

Le rapport commence par analyser différents concepts essentiels pour la question de la viabilité financière (section 2). L'analyse porte en premier lieu sur un concept d'équilibre statique (équilibre de type PAYG). Elle se concentre en second lieu sur un concept dynamique d'équilibre, celui d'équilibre actuariel.

La section 3 énumère les différents instruments susceptibles d'être utilisés pour ajuster les systèmes de retraite aux changements démographiques et économiques et en garantir ainsi la viabilité financière. La discussion porte notamment sur quatre instruments déjà utilisés dans certains pays de l'OCDE ou de l'UE :

(i) L'ajustement du niveau des prestations (ou de la valeur des prestations de retraite), ce qui réduit directement les dépenses ;

(ii) L'ajustement de l'âge ouvrant droit à la retraite, ce qui réduit les dépenses en raccourcissant la durée de versement des prestations et augmente les recettes en allongeant la durée de paiement des cotisations ;

(iii) L'ajustement des taux de cotisation, ce qui augmente les recettes du régime, et

(iv) La mise en place et l'appui sur un fonds de réserve, s'il en existe un.

La section 4 traite plus en détail des trois premiers instruments et de leur mise en œuvre, tandis que la section 5 se concentre principalement sur les fonds de réserve.

Plus particulièrement, la section 4 analyse les ajustements apportés aux prestations de retraite, à l'âge de départ à la retraite et aux taux de cotisation. Les mécanismes d'ajustement du montant des prestations, décrits en premier lieu, consistent souvent à apporter des changements au mode de calcul des prestations, souvent de façon indirecte. En pratique, les facteurs d'ajustement des prestations dépendent souvent de l'évolution de certains indicateurs démographiques (comme l'espérance de vie et le taux de dépendance vieillesse) ou de variables économiques (croissance du PIB ou revenus moyens, par ex.).

Certaines seulement de ces approches indirectes peuvent toutefois être considérées comme des **mécanismes d'ajustement automatique**. Il existe de fait **trois mécanismes automatiques principaux** pour modifier la valeur des pensions :

- premièrement, des ajustements peuvent être apportés au montant des prestations pour tenir compte de l'évolution de l'**espérance de vie** ;
- deuxièmement, des ajustements peuvent intervenir par **valorisation** des gains des années antérieures ;
- troisièmement, des ajustements peuvent intervenir par **indexation** des pensions en cours.

Dans le contexte des régimes publics de retraite, l'ajustement du montant des prestations lié à l'évolution de l'espérance de vie est mis en œuvre soit de façon directe dans certains régimes à prestations définies (Portugal et Finlande, par ex.), soit par le biais de l'adoption de comptes notionnels (Italie, Lettonie, Norvège, Pologne et Suède).

La procédure de valorisation, utilisée pour tenir compte de l'évolution des coûts et du niveau de vie entre la période d'acquisition des droits à la retraite et la période de versement des prestations, a un impact important sur le niveau des pensions. Le Japon est l'un des pays qui utilisent cette procédure comme mécanisme d'ajustement automatique. Suite à la réforme de 2004, des modifications ont été apportées à la procédure de valorisation pour tenir compte de l'évolution du nombre de contributeurs actifs.

Un lien existe dans certains cas entre la valorisation (c'est-à-dire l'indexation des prestations avant la retraite) et l'indexation des prestations après la retraite. Si l'indexation est une pratique courante, un lien « explicite » avec la viabilité du système n'est établi que par un nombre restreint de pays de l'OCDE, à savoir l'Allemagne, le Canada, le Japon, le Portugal et la Suède. Au Canada, par exemple, l'indexation des pensions en cours est gelée pendant les trois années qui suivent l'augmentation des taux de cotisation, jusqu'à la publication du suivant rapport actuariel et au réexamen du régime des retraites. En Suède, où le calcul de la rente tient déjà compte du lien avec l'espérance de vie, l'indexation des pensions en cours cherche à préserver la solvabilité du système.

L'augmentation de l'âge de la retraite est un choix de plus en plus fréquent dans les pays de l'OCDE, puisque plus de la moitié d'entre eux ont procède déjà à des réformes en ce sens. Dans la plupart des cas, ces modifications doivent respecter un calendrier fixé par la loi. Une fois ces réformes mises en œuvre, l'âge normal du départ à la retraite sera compris entre 60 et 68 ans (et plus encore) dans les pays de l'OCDE, avec une moyenne à 65,6 ans pour les hommes et 65 pour les femmes en 2050. Cette mesure ayant un impact à la fois sur la durée de cotisation obligatoire et sur la durée de versement des rentes, un lien entre l'âge de la retraite et l'espérance de vie devrait sembler au moins aussi indiqué, voire davantage, qu'un lien avec les prestations. Seuls quelques pays de l'OCDE ont pourtant établi un tel lien dans leur système de retraite. Le Danemark, après avoir relevé l'âge de la retraite à 67 ans, a adopté des dispositions permettant d'indexer l'âge de la retraite sur l'augmentation de l'espérance de vie. Une approbation du Parlement danois est toutefois nécessaire avant tout relèvement de l'âge de la retraite. Une telle décision interviendra, le cas échéant, sur la base d'un examen de l'espérance de vie qui sera réalisé tous les cinq ans à partir de 2015. L'âge de la retraite sera également indexé sur l'espérance de vie en Grèce et en Italie, respectivement à partir de 2021 et de 2013.

L'utilisation des taux de cotisation comme mécanisme de stabilisation automatique est moins fréquente. La plupart des interventions effectuées ces dernières années visaient principalement à maintenir ces taux à un niveau stable. Ce dispositif est néanmoins utilisé par certains pays comme le Canada et l'Allemagne. Au Canada, une augmentation du taux de cotisation est possible si *(i)* le Régime de pensions du Canada démontre dans son rapport actuariel que le taux fixé par la loi est inférieur au taux minimum de cotisation requis pour assurer la viabilité du plan et si *(ii)* les

ministres fédéraux et provinciaux ne parviennent pas à s'entendre sur une solution alternative. En Allemagne, le facteur de viabilité est utilisé non seulement pour indexer les prestations initiales, mais aussi pour augmenter les taux de cotisation.

La section 5 examine l'utilisation d'un fonds de réserve. Elle montre que la moitié des pays de l'OCDE a constitué des fonds de réserve publics pour aider au paiement futur des pensions publiques. Les fonds de réserve publics s'élevaient dans ces pays à près de 10 % du PIB en moyenne en 2009, ce qui équivaut en US$ à 5'400 milliards. Le « financement anticipé » des dépenses de retraite par la constitution de réserves publiques vise à prévenir l'apparition de certains problèmes. Ces réserves sont ainsi utilisées pour empêcher *(i)* une augmentation excessive des taux de cotisation à l'avenir, *(ii)* une dégradation du traitement de vastes cohortes de retraités (la génération du baby-boom, par ex.), et *(iii)* une réduction excessive des prestations versées par les régimes de retraite par répartition qui serait nécessaire pour maintenir un budget équilibré sans augmentation des taux de cotisation.

L'économie politique des mécanismes d'ajustement automatique est discutée dans la section 6, qui expose de quelle façon ces mécanismes ont fonctionné dans la réalité. Très peu de pays semblent avoir réussi en pratique à combiner les différentes options existantes pour l'ajustement automatique des systèmes de retraite. Différentes raisons peuvent expliquer cette incapacité à adopter des mécanismes globaux. La pression exercée par des groupes d'intérêts et les normes réglant le droit aux prestations peuvent par exemple interférer avec la conception et le fonctionnement des mécanismes. Le manque de temps, de financement ou d'expertise peut conduire dans d'autres cas à retarder l'introduction du mécanisme. Les responsables politiques peuvent aussi décider de suspendre ou de modifier la mise en œuvre de mécanismes après qu'ils aient été annoncés.

Enfin, le choix entre les instruments analysés dans ce rapport a des implications importantes et suppose de trouver un compromis entre les différents objectifs du système de retraite. Des réductions déclenchées par un mécanisme d'ajustement automatique et nécessaires pour garantir l'équilibre financier du système peuvent par exemple conduire à un niveau de prestations qui ne permet plus aux retraités de mener une vie décente. Les dépenses supplémentaires de protection sociale qui en résultent peuvent annuler l'essentiel des économies réalisées ailleurs. En outre, le fait de relever l'âge de départ à la retraite ne garantit pas nécessairement à lui seul que les personnes travailleront plus longtemps. D'autres obstacles (notamment du côté de la demande) peuvent en effet empêcher les travailleurs âgés de trouver et de conserver un emploi (voir D'Addio et al. 2010).

C'est pourquoi il est important de se concentrer non seulement sur l'objectif de viabilité financière et sur les moyens d'y parvenir, mais aussi sur l'adéquation des prestations, et ainsi sur la viabilité sociale des systèmes de retraite. Le maintien de l'équilibre financier et actuariel devrait être recherché tout en respectant un ensemble de règles ou de principes visant à garantir un niveau adéquat des prestations. Il n'en demeure pas moins que des mécanismes d'ajustement automatique, lorsqu'ils sont conçus et mis en œuvre de façon à garantir un caractère graduel aux changements, mais aussi lorsqu'ils sont transparents et répartissent les efforts de façon équitable entre les générations, peuvent aider les particuliers à agir de façon proactive, en adaptant leur comportement en matière d'épargne et d'offre de travail.

Riassunto

L'aumento quasi continuo dell'aspettativa di vita nei Paesi industrializzati, rappresenta una sfida per la politica in generale e i sistemi pensionistici in particolare. Negli ultimi 15 anni quest'evoluzione ha indotto numerosi Paesi a introdurre forme di collegamento *automatico* tra il sistema pensionistico, da una parte, e l'evoluzione demografica e l'andamento finanziario, dall'altra.

Quest'importante innovazione è molto interessante, per motivi sia economici che politici. Rendere automatico l'adeguamento dei parametri dei sistemi pensionistici significa teoricamente far sì che il finanziamento delle pensioni diventi in una certa misura immune dalle perturbazioni economiche e demografiche. Fornisce inoltre un quadro generale chiaro e logico per i cambiamenti, come per esempio i tagli alle prestazioni, la cui introduzione graduale risulta difficile a livello politico. Come altri meccanismi di *"pre-impegno* " riscontrabili in politica economica, per esempio in campo monetario e fiscale, questo meccanismo è strutturato in maniera tale da accrescere la credibilità del sistema e assicurare che in futuro i sistemi pensionistici pubblici non costituiscano improvvisamente un onere per le finanze pubbliche. Garantire la sostenibilità finanziaria dei sistemi pensionistici è diventato ancora più urgente nel contesto economico attuale. Nel presente rapporto si discutono i vari meccanismi di adeguamento automatico attualmente usati, o che potrebbero esserlo, nei sistemi pensionistici dei Paesi OCSE.

Il rapporto inizia con un'analisi dei diversi principi di sostenibilità finanziaria (sezione 2).

In primo luogo, si analizza il principio statico, quello dell'equilibrio nel sistema PAYG (*pay-as-you-go*, ovvero sistema a ripartizione). In secondo luogo, ci si focalizza sul principio dinamico, quello dell'equilibrio attuariale.

La sezione 3 presenta un elenco dei diversi strumenti impiegabili per adeguare i sistemi pensionistici ai cambiamenti demografici ed economici così da renderli sostenibili dal punto di vista finanziario. La discussione si concentra su quattro strumenti, impiegati in alcuni Paesi dell'OCSE e dell'UE:

(v) adeguamento del livello (o del valore) delle prestazioni pensionistiche, riducendo così direttamente le uscite;

(vi) adeguamento dell'età pensionabile: la spesa si riduce perché diminuisce la durata del periodo di erogazione delle pensioni e contemporaneamente aumentano le entrate tramite l'allungamento del periodo di contribuzione;

(vii) adeguamento delle aliquote contributive, aumentando così le entrate del sistema

(viii) attingere a un fondo di riserva, se ne esiste uno.

I primi tre strumenti e la loro attuazione sono descritti in maggior dettaglio nella sezione 4; la sezione 5 si concentra sui fondi di riserva.

Nella sezione 4, in particolare, si analizza il modo in cui vengono attuati gli adeguamenti delle prestazioni pensionistiche, dell'età pensionabile e delle aliquote contributive.

L'adeguamento dei livelli delle prestazioni pensionistiche, il primo strumento trattato, è il meccanismo più diffuso. Tale adeguamento avviene spesso mediante cambiamenti indiretti nella formula di calcolo delle medesime. Nella prassi i fattori di adeguamento delle prestazioni spesso dipendono dal comportamento di alcuni indicatori demografici (quali l'aspettativa di vita o il tasso di dipendenza degli anziani) o economici (per esempio, la crescita del PIL o dei redditi medi).

Tuttavia, solo alcuni di questi approcci indiretti sono da ritenersi **meccanismi di adeguamento automatico**. Di fatto, esistono **tre principali meccanismi automatici** per modificare il valore delle pensioni:

- in primo luogo si possono adeguare i livelli delle prestazioni in funzione dei cambiamenti dell'**aspettativa di vita**;
- in secondo luogo si possono ottenere adeguamenti tramite la **valutazione** dei redditi di inizio carriera; e
- in terzo luogo si possono indurre adeguamenti mediante l'**indicizzazione** delle pensioni in pagamento.

Nell'ambito dei sistemi pensionistici pubblici, l'adeguamento dei livelli delle prestazioni in funzione dell'aspettativa di vita è attuato direttamente in alcuni Paesi con sistemi a prestazione definita (p. es. Portogallo e Finlandia) o mediante l'adozione di sistemi "a contributo definito figurativo" – notional defined contribution, NDC– , (Italia, Lettonia, Norvegia, Polonia e Svezia).

La procedura di rivalutazione utilizzata per tenere conto dei cambiamenti del costo e degli standard di vita tra il periodo in cui i diritti vengono maturati e quello in cui vengono rivendicati, ha effetti considerevoli sui redditi di pensione. Uno dei Paesi che ha adottato questo meccanismo di adeguamento automatico è il Giappone: con la riforma del 2004 la rivalutazione è stata modificata in maniera tale da tenere conto dell'evoluzione del numero di contribuenti attivi.

In alcuni casi, vi è un collegamento tra la rivalutazione delle retribuzioni (prima del pensionamento) e l'indicizzazione delle prestazioni pensionistiche (dopo il pensionamento). Nonostante l'indicizzazione sia una prassi comune, solo un numero limitato di Paesi OCSE, ossia Canada, Germania, Giappone, Portogallo e Svezia, ha introdotto un collegamento "esplicito" con la sostenibilità del sistema. In Canada, per esempio, quando aumentano le aliquote contributive, si sospende l'indicizzazione delle pensioni in pagamento per tre anni fino alla pubblicazione del nuovo rapporto attuariale e la revisione del piano pensionistico. In Svezia, oltre al collegamento con l'aspettativa di vita incluso nel calcolo della pensione, vi è l'indicizzazione delle pensioni in pagamento con cui si cerca di mantenere la solvibilità del sistema.

Innalzare l'età pensionabile sta diventando una prassi sempre più comune nei Paesi OCSE: oltre la metà di essi ha adottato questa misura all'interno dei propri sistemi pensionistici nazionali, nella maggior parte dei casi secondo scadenzari fissati per legge. Una volta completate tutte le riforme, l'età pensionabile ordinaria nei Paesi OCSE varierà tra i 60 e i 68 anni e oltre; la media sarà pari a 65,2 anni. Questa misura interessa sia il periodo di contribuzione necessario, sia la durata del periodo di erogazione delle prestazioni. Il collegamento dell'età pensionabile con l'aspettativa di vita sarebbe, logicamente, almeno altrettanto sensato – se non addirittura di più – del collegamento con le prestazioni, ma solo pochi Paesi OCSE lo prevedono nei propri sistemi pensionistici. Tra questi c'è la Danimarca, le cui disposizioni permettono l'indicizzazione dell'età pensionabile in funzione dell'aspettativa di vita dopo l'innalzamento generale di quest'età a 67 anni; tuttavia, per ogni aumento è richiesta l'approvazione del Parlamento danese. L'incremento sarà in ultima analisi il risultato di una revisione dell'aspettativa di vita eseguita a cadenza quinquennale a partire dal 2015. La Grecia e l'Italia adegueranno l'età pensionabile all'aspettativa di vita a partire, rispettivamente, dal 2021 e dal 2013.

L'utilizzo delle aliquote contributive come meccanismo di stabilizzazione automatico è meno comune, anzi molti degli interventi degli scorsi anni miravano soprattutto a mantenerle stabili. Tuttavia, alcuni Paesi, come Canada e Germania, utilizzano questo meccanismo. In Canada, le aliquote contributive possono essere innalzate a condizione che (i) il Piano pensionistico canadese dimostri nel suo rapporto attuariale che l'aliquota fissata per legge è al di sotto dell'aliquota

contributiva necessaria per mantenere la sostenibilità del Piano; e (ii) i ministri a livello federale e provinciale non trovino un accordo su una soluzione alternativa. In Germania il fattore di sostenibilità è utilizzato sia per indicizzare le prestazioni iniziali sia per aumentare le aliquote contributive.

La sezione 5 tratta l'utilizzo dei fondi di riserva. Metà dei Paesi OCSE ha costituito riserve nei propri sistemi pensionistici pubblici per garantire il pagamento delle pensioni statali in futuro. Nel 2009 in questi Paesi le riserve pubbliche ammontavano in media a quasi il 10% del PIL, ovvero circa 5400 miliardi di USD. Con il prefinanziamento delle future pensioni mediante fondi di riserva pubblici si cerca di evitare alcuni problemi che altrimenti si verificherebbero: in primo luogo, l'aumento eccessivo delle aliquote contributive in futuro; in secondo luogo, il trattamento peggiore di grandi coorti di pensionati (per esempio la generazione dei *baby boomers*); in terzo luogo, la riduzione eccessiva delle prestazioni erogate dai sistemi PAYG, che risulterebbe invece necessaria per mantenere l'equilibrio del bilancio in assenza di meccanismi quali l'aumento delle aliquote contributive.

La sezione 6 affronta i meccanismi di adeguamento automatico dal punto di vista dell'economia politica, partendo dalla descrizione di come essi funzionano nel concreto. Solo pochi Paesi sono riusciti apparentemente ad abbinare nella prassi le diverse opzioni discusse per l'adeguamento automatico dei sistemi pensionistici. La mancanza di meccanismi globali sembra avere varie ragioni. La pressione esercitata da gruppi d'interesse e le norme sui diritti alle prestazioni possono causare un'interferenza con l'impostazione dei meccanismi e il loro funzionamento. In altri casi possono essere la mancanza di tempo, di fondi o di conoscenze specialistiche a ritardare l'introduzione di tali meccanismi. Si puó anche decidere di sospendere o cambiare il modo in cui attuare i meccanismi, una volta annunciati.

Infine, la scelta tra gli strumenti analizzati nel presente rapporto ha effetti significativi, inclusi dei *trade off* con altri obiettivi del sistema pensionistico. Per esempio, i tagli necessari per raggiungere una situazione di equilibrio finanziario innescati dal meccanismo di adeguamento possono risultare alla fine in livelli di prestazioni pensionistiche troppo bassi per garantire il sostentamento dei pensionati. Le spese aggiuntive per *safety nets* possono annullare gran parte dei risparmi realizzati in altri punti del sistema. Inoltre, aumentare l'età pensionabile può rivelarsi insufficiente per mantenere i lavoratori più a lungo in attività, se vi sono altri ostacoli (per esempio, dal lato della domanda) nella ricerca e nel mantenimento di un posto di lavoro per i lavoratori anziani (cfr. D'Addio *et al.* 2010).

Pertanto è importante focalizzarsi non soltanto sulla sostenibilità finanziaria e sul modo di raggiungere quest'obiettivo, ma anche sull'adeguatezza delle prestazioni e quindi sulla sostenibilità sociale dei sistemi pensionistici. L'obiettivo di mantenere l'equilibrio finanziario e attuariale dovrebbe andare di pari passo con regole o principi atti a garantire che i livelli delle prestazioni rimangano adeguati. Ciononostante, i meccanismi di adeguamento automatico concepiti e attuati in maniera tale che i cambiamenti avvengano gradualmente, che siano trasparenti e distribuiscano equamente il peso tra le generazioni possono aiutare le persone ad agire in modo proattivo, adattando il proprio atteggiamento nei confronti del risparmio e dell'offerta di lavoro.

OECD Social Policy Division

Towards Financial Sustainability Of Pension Systems

The Role Of Automatic-Adjustment Mechanisms in OECD and EU Countries

Anna Cristina D'ADDIO and Edward WHITEHOUSE

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EXECUTIVE SUMMARY

The near-continuous increase in life-expectancy occurring in developed countries brings with it a challenge for public policy in general – and pension systems in particular. These developments have prompted many countries in the past 15 years to introduce an *automatic* link between demographic and financial developments and the retirement-income system.

This important innovation is attractive, for economic reasons as well as politically. Making adjustment of pension system parameters automatic means in theory that pension financing is, to some extent, immunised against demographic and economic shocks. It provides a logical and neat framework for changes – such as cuts in benefits – that are politically difficult to introduce on a piecemeal basis. Like other pre-commitment mechanisms in economic policymaking – in monetary and fiscal policy, for example – it is designed to enhance credibility and provide assurance that public pension schemes will not place an unexpected burden on the public finances in the future. Ensuring financial sustainability of pension systems has become an even more pressing challenge in the current economic context. This report discusses which types of automatic adjustment mechanisms are or could be used in public pension systems in OECD countries.

The report starts with the analysis of the different concepts underpinning financial sustainability (Section 2). First, a static concept (PAYG equilibrium) is considered. Second, the focus is on a dynamic concept, that of actuarial equilibrium.

Section 3 lists the different instruments that can be used to adjust pension systems to demographic and economic changes in order to make public pension systems financially sustainable. The discussion is centred on four instruments that have been used in some OECD and other EU countries :

(v) adjustments in the benefit level (or the value of pension benefits), which directly reduces expenditures;

(vi) adjustments in pension eligibility ages, which cuts spending by reducing the duration over which pensions are paid and increases revenues through longer payment of pension contributions;

(vii) adjustment in contribution rates, which increase the revenues of the scheme and

(viii) drawing on a reserve fund, providing one exists.

The first three instruments and their implementation are described in greater detail in section 4, while Section 5 mainly concentrates on the reserve funds.

More particularly, Section 4 analyses how adjustments in pension benefits, pensionable eligibility ages and contributions rates are implemented. Starting with the adjustment of benefit levels, this is the most common instrument and often occurs through indirect changes to the benefit formula. In practice the adjustment factors of the benefits often depend on the behaviour of some demographic indicators (such as life expectancy and the old-age dependency ratio) or economic variables (such as growth in GDP or average earnings).

However, only some of these indirect approaches can be considered as **automatic adjustment mechanisms**. Effectively, there are **three main automatic mechanisms** for changing pension values.

- First, adjustments can be made in benefit levels to reflect changes in **life expectancy**;
- Second, adjustments can occur through **valorisation** of earlier years' earnings; and
- Thirdly adjustments may occur through **indexation** of pensions in payment.

In the context of public schemes, adjustment of benefit levels related to life expectancy changes are implemented directly in some defined-benefit schemes (e.g. Portugal and Finland) or through adopting notional accounts (Italy, Latvia, Norway, Poland and Sweden).

Concerning the valorisation procedure, used to reflect changes in costs and standards of living between the time that the pension entitlement was earned and when it is drawn, its impact on retirement incomes is large. Japan is one of the countries that use it as an automatic adjustment mechanism. Following the 2004 reform, valorisation is modified to account for the evolution of the active contributors.

In some cases, there is a link between valorisation (i.e., pre-retirement indexation) and post-retirement indexation. Although the indexation is a common practice, only in a limited number of OECD countries – Canada, Germany, Japan, Portugal and Sweden – indexation is “explicitly” related to the sustainability of the system. For example, in Canada, when an increase in contribution rates takes place the indexation of pensions in payment is frozen for three years until the publication of the next actuarial report and the reassessment of the pension plan. In Sweden, in addition to the

life-expectancy link embedded in the calculation of the annuity, indexation of pensions in payment tries to ensure that the solvency of the system is maintained.

Increasing pensionable age is becoming increasingly common in OECD countries: more than half of OECD countries are increasing ages for national pension schemes. In most cases the increases are expected to take place according to schedules fixed by the law. Normal pension ages will vary between 60 and 68 and above in OECD countries once reforms are fully in place, with an average of 65.2 years. This measure addresses both the necessary contribution period and the time over which the benefits are paid. A link of pension age to life expectancy should therefore make at least as much or more intuitive sense as a benefit link. However, only a few OECD countries have such a link in their pension system. Among OECD countries Denmark, has provisions that allow the retirement age to be indexed in line with the increases in life expectancy after an initial increase of the retirement age to 67. However, previous approval of the Danish Parliament is required to any increase in the retirement age. The eventual increase will result from a review of life expectancy done on five-year intervals starting from 2015. Greece (2021) and Italy (2013) will have retirement age indexed on life expectancy starting at the dates mentioned.

The use of contribution rates as an automatic stabiliser is less common, and many of the interventions that have taken place in recent years have mainly aimed to keep the rates at a stable level. However some countries, such as Canada and Germany use this device. In Canada, contribution rate may be increased conditional on (i) the Canada Pension Plan shows in its actuarial report that the legislated rate is lower than the minimum contribution rate required for the sustainability of the plan; and (ii) that the federal and provincial ministers do not reach agreement on an alternative solution. In Germany the sustainability factor is not used only to index initial benefits but also to increase contribution rates.

The use of a reserve (or buffer fund) is discussed in section 5. It shows that half of OECD countries have built up public pension reserves to help pay for state pensions in future. In these countries, public pension reserves were worth nearly 10% of GDP on average in 2009, some US$ 5.4 trillion. "Pre-funding" future pension spending with public reserves tries to avoid some problems that might otherwise occur. First, they are used to prevent contribution rates from rising too high in the future. Second, to prevent a worse treatment of large cohorts of retirees (e.g. the baby boom generation); and third, an excessive reduction of the benefits provided by PAYG pension schemes, that would be necessary to maintain a balanced budget in the absence, for example, of an increase in the contribution rates.

The political economy of automatic adjustment mechanisms is discussed in section 6, which sets out how such mechanisms have operated in practice. Very few countries appear to have managed to combine in practice the different options discussed for the automatic adjustment of pension systems. This failure to adopt comprehensive mechanisms may have various reasons. Pressure from interest groups and norms about benefit entitlement may interfere with the design of the mechanisms and their functioning. In other cases, lack of time, funding or expertise may lead to delay the introduction of the mechanism. Politicians may also decide to suspend or to change the way such mechanisms will be implemented once they have been announced.

Finally, the choice between the instruments analysed in this report has significant implications, involving trade-offs with other objectives of the pension system. For example, cuts needed to achieve financial equilibrium and triggered by the adjustment mechanism might eventually result in a benefit level too low for retirees to live on. Extra spending on safety-nets benefits might offset much of the savings made elsewhere. Also, increases in pension ages alone may be insufficient to ensure that people work longer if there are other barriers (on the demand side, for example) to older workers finding and retaining jobs (see D'Addio *et al.* 2010).

It is therefore important to focus not only on financial sustainability and the ways to achieve this objective, but also on the adequacy of benefits, and thus on the social sustainability of pension systems. Maintaining financial and actuarial balance should be pursued together with a set of rules or principles to ensure that benefit levels remain adequate. Nevertheless, automatic adjustment mechanisms that are designed and implemented so that changes occur gradually, that are transparent and share the possible burden fairly across generations might help individuals to act pro-actively by adapting their saving and labour supply behaviours.

TOWARDS FINANCIAL SUSTAINABILITY OF PENSION SYSTEMS: THE ROLE OF AUTOMATIC-ADJUSTMENT MECHANISMS IN OECD AND EU COUNTRIES

Final Report – 1 Juin 2012

Anna Cristina D'ADDIO and Edward WHITEHOUSE

1. Introduction

Near-continuous increases in life expectancy in developed countries over many decades are a great achievement, but one that brings with it a challenge for public policy in general – and pension systems in particular. The need for pension reform to meet the pressures of an ageing population and ensure pensions are affordable has been apparent for some time. But in most countries, there have been consistent under-estimates of longevity. This has required repeated changes to parameters and rules, as changes to pension systems have only stabilised the financial situation temporarily.

These developments have prompted many countries in the past 15 years to introduce an *automatic* link between demographic and financial developments and the retirement-income system. This important innovation is attractive, for economic reasons as well as politically. The automaticity of adjustments means that pension financing is, to some extent, immunised against demographic and economic shocks. It provides a logical and neat rationale for changes – such as cuts in benefits – that are politically difficult to introduce. Like other pre-commitment mechanisms in economic policymaking – in monetary and fiscal policy, for example – it is designed to ensure credibility: public pension schemes should not place an unexpected burden on the public finances in the future.

These automatic-adjustment mechanisms are designed, directly or indirectly, to help achieve financial sustainability. As it will become clear in the following pages, the two concepts of Pay-as-you-go (PAYG) equilibrium and actuarial equilibrium – often encountered in discussions about financial sustainability have not the same implications for financial sustainability. This is mainly because the horizon to which they refer differs. PAYG equilibrium (i.e. the condition that in year t there is a balance between contributions and pension benefits or in other terms a balance between the revenues of the year and the outgoings of the same year) is mainly a static concept. By contrast, actuarial equilibrium (i.e. the balance between the present value at a particular date liabilities of the pension system and the present value of the contribution assets that back up those promises) is a long-term (and clearly dynamic) concept Section 2 shows that financial sustainability is a concept that is difficult to pin down, setting out various alternative approaches. It also discusses the time periods over which the finances should be assessed. Section 3 shows the different ways in

which pension systems can adjust to demographic and economic change and the policy instruments that can be used to ensure sustainability. Section 4 goes into greater detail in the precise design of adjustments to benefits. The concept of a public pension reserve fund as a financial buffer against demographic and economic shocks is introduced in section 5. The political economy of automatic adjustment mechanisms is discussed in section 6, which sets out the attractions of this approach and how such mechanisms have operated in practice. Section 7 presents a summary and some conclusions of the report.

2. Defining financial sustainability

Pension systems involve long-term financial commitments: promises to pay benefits during retirement to today's workers cover a period spanning many decades. The capacity to meet these promises is one of the most important issues in the design of retirement-income systems.

With pure defined-contribution schemes – where benefits depend solely on the value of contributions and on the investment returns earned – financial sustainability is not an issue. At any point in time, the value of future pension liabilities is exactly the same as the value of the assets in the funds. [1]

For all other types of pension arrangement, the issue of financial sustainability is important. This is most obvious in cases where benefits are financed on a pay-as-you-go (PAYG) basis, where current contributions pay for current benefits. However, it also applies to earnings-related schemes that are financed on a funded basis – where there are assets to back future pension promises – or are partially pre-funded. This group of schemes includes private defined-benefit schemes (in the Netherlands, for example) and public programmes with reserves (such as the defined-benefit schemes in Finland and the notional-accounts scheme in Sweden).

2.1 Sustainable rates of return on PAYG schemes

The starting point for the analysis is the framework of Samuelson (1958), as extended by Aaron (1966). In simple terms, the Aaron-Samuelson condition shows that, in a PAYG system, the fiscally sustainable rate of return is the sum of productivity (or average-earnings) growth and the growth (or shrinkage) of the workforce (i.e. employment growth). In other terms this condition states a public pension system is affordable in the long term if on average it pays those who contribute to

[1] However, the recent financial and economic crisis has shown that defined contributions may be hardly hit also (see D'Addio and Whitehouse, 2010). The value of assets has dropped substantially. Those individuals close to retirement in countries where defined contributions are widely present have supported the highest losses. Their wealth has been consistently reduced and the impact is exacerbated by low interest rates which penalise those that are very close to the purchase an annuity (see OECD, 2009).

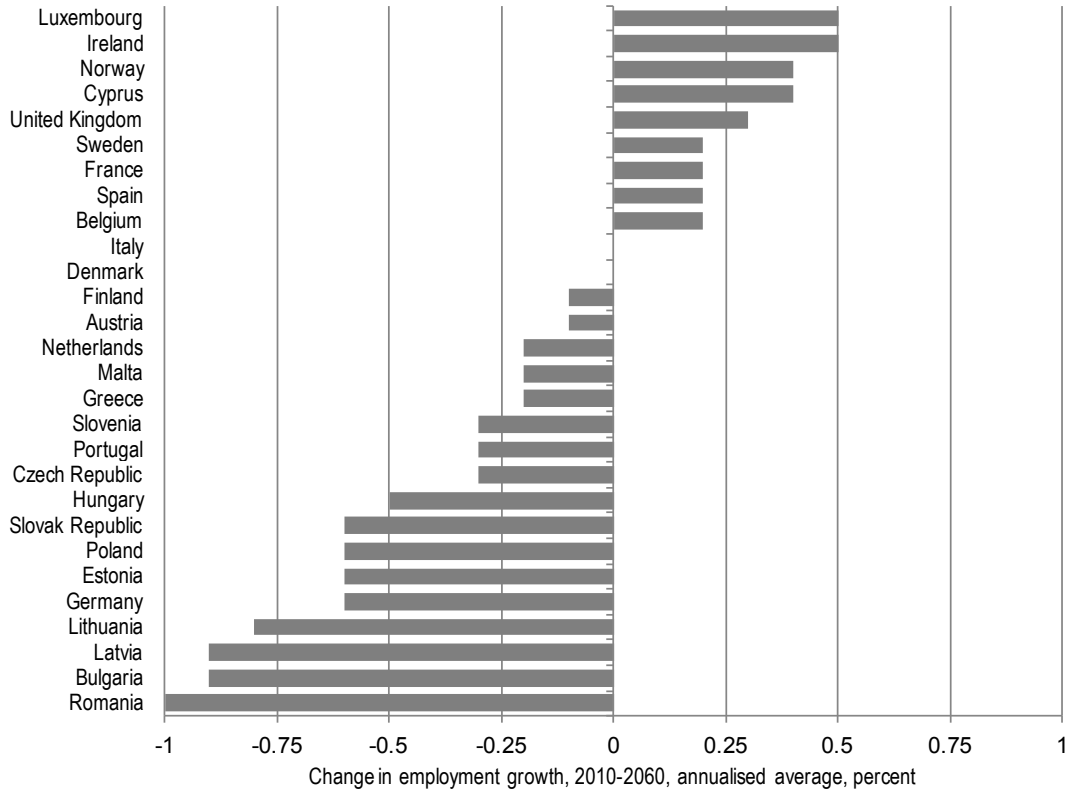
the system a rate of 'return' equal to the growth of the labour force (in real efficiency units). The reason for this result is simple too because these growth rates give the rate of growth of revenues in a scheme financed by employer and employee contributions levied on earnings. If the implicit rate of return on pensions is higher than this, then the system rapidly becomes insolvent: costs spiral upward at a faster rate than contribution revenues grow. If the rate of return on pension is below this level, then the scheme increasingly becomes a tax penalty on workers.

Generally, it is assumed that average earnings in the economy grow over time to reflect productivity gains. Employment has tended to increase in the past (with cyclical variations) but many OECD countries' workforces are projected to shrink in the future.

Based on data contained in the European Commission's (2012) *Ageing Report*, Figure 1 shows that the Aaron-Samuelson condition implies that cross-country differences in the sustainable rate of return on pay-as-you-go pensions are substantial. For eight member states of the European Union (plus Norway), employment was projected to grow between the 2010 baseline year of the projections and the 2060 horizon. In contrast, 17 member states were expected to see a decline in aggregate employment. The nine largest declines – of 0.5-0.9% per year – were projected for Bulgaria, Estonia, Germany, Hungary, Latvia, Lithuania, Poland, Romania and the Slovak Republic. The aggregate decline for the EU27 is 0.1% per year. These forecasts therefore suggest that, *ceteris paribus*, the replacement rate must decline over time to achieve financial sustainability.[2]

[2] This can be easily derived from the static measure of the PAYG pension cost.

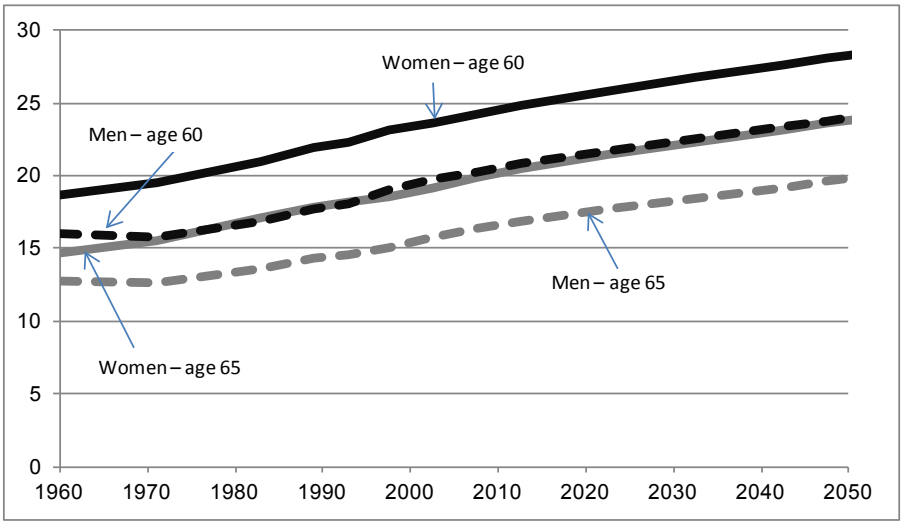
Figure 1. Projected annual growth in employment, 2010-2060



Source: European Commission (2012), Table A 17.

However, the Aaron-Samuelson framework, at this basic level, does not take full account of the impact of demographic change on the pension system. Population ageing that is driven by changes in fertility – the most profound driver of demographics – is implicitly accounted for by its impact on the size of the labour force. However, the effect of increasing life expectancy needs to be added in explicitly. This analysis uses the figures from the United Nations population division for OECD countries (*World Population Prospects – 2008 Revision*) that were also used for *Pensions at a Glance 2011* The projections suggest further increases in life expectancy between 2010 and 2050. The additional years of life expectancy at age 65 are projected to grow by 3.0 years for men and 3.5 years for women between 2010 and 2050. As in the past, the lengthening of life expectancy at age 60 is greater, but by a smaller margin than observed between 1960 and 2010. Using data on pensionable age based on OECD (2011) combined on information on developments in mortality and life expectancy gives the number of additional years of life after normal pension age (on average) between countries and over time. This concept here called "expected retirement duration" illustrates the length of the period over which pension benefits must be paid. It is thus an important determinant of cost of paying for pensions.

Figure 2. Life expectancy at age 60 and 65 by sex, OECD average, 1960-2050



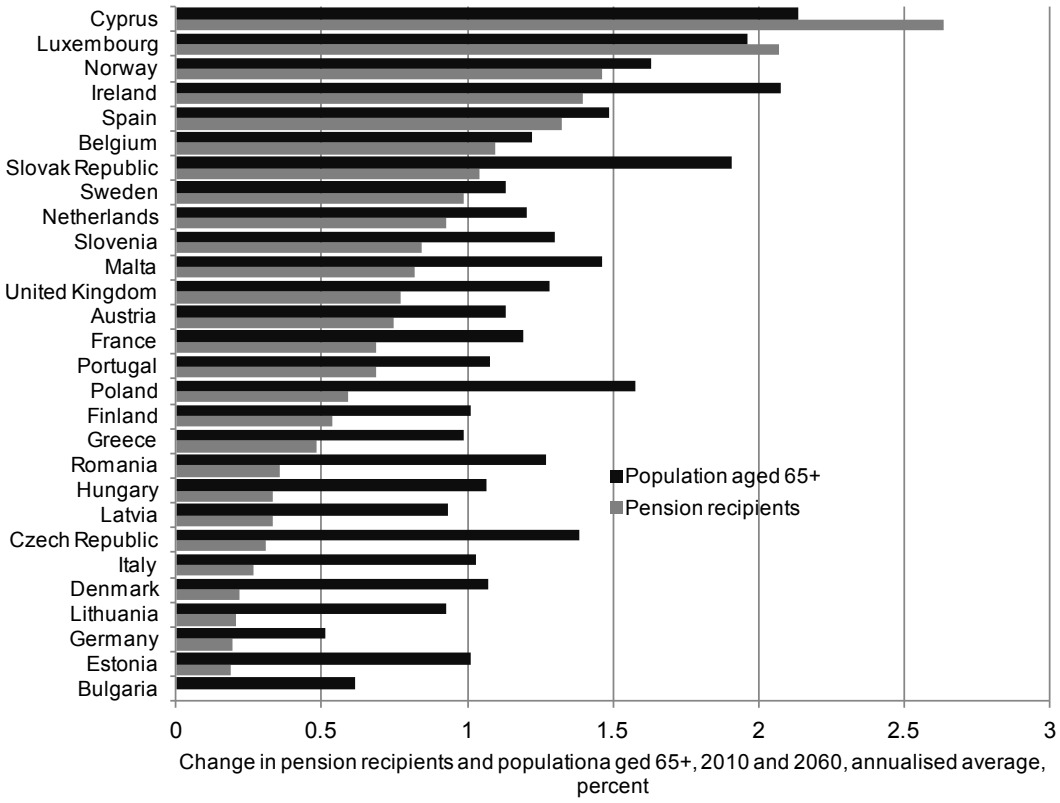
Source: Historical data on life expectancy from the OECD Health Database 1960-95. Recent data and projections of life expectancy in the future based on the United Nations Population Division Database, World Population Prospects – The 2008 Revision as in OECD (2011), *Pensions at a Glance 2011.*

Offsetting some of the impact of longer lives on pension systems, many countries have increased pensionable ages or tightened the qualifying conditions for receiving early-retirement benefits. (These changes are extensively documented in Chapters I.1 and I.3 of OECD, 2011. See also Chapter 1 of OECD, 2012)

The black bars in Figure 3 show the annual growth rate in the number of people aged 65 and over projected for the period 2010 to 2060. For the EU27, the number of older people is projected to grow by around 1.12% per year, a rise of around 75% over the whole period. Growth is expected to be most rapid in Ireland, Luxembourg, Norway, Poland and the Slovak republic at rates between 2.08% and 1.58% per year.

However, reform measures to increase the effective age of retirement mean that increases in the number of people receiving pensions are expected to be lower than the growth of over 65s: 0.6% compared with 1.12% for the EU27. (The rate of growth of the number of pensioners is shown by the grey bars in Figure 3.) In only two countries – Cyprus and Luxembourg – is the rate of growth of pension recipients expected to exceed the rate of growth of over 65s.

Figure 3. Projected annual growth in pension recipients and population aged 65 and over, 2010-60



Source: European Commission (2012), Table A 78 and calculations based on Tables A 8 and A 12.

Adding the change in employment (Figure 1) and the change in the number of pension recipients (figure 3) gives an overall sustainable rate of return on pay-as-you-go pensions in the Aaron-Samuelson framework. For the EU27 as whole, this differential is -0.7% a year, ranging from -0.2% in Denmark to -2.2% in Cyprus.

The Aaron-Samuelson framework, however, is not universally applicable to different countries. It requires that public pensions are financed from public-pension contributions levied on earnings. Denmark, for example, does not levy contributions to pay for public pensions. Ireland and the United Kingdom levy an overall "social-security" contribution designed to finance a range of benefits.

Box 1. The Aaron-Samuelson framework in practice

Suppose that individuals live two periods. During the first period they work, while they spend the second period of time as retirees. Suppose also that the number of workers at time t is W_t and that their average wage is w_t.

Assume that the number of workers increases over time according to the following rule $L_t=L_{t-1}(1+n)$ while the average wage grows according to $w_{t+1}=w_t(1+g)$. Suppose that there is a social security programme paying benefit b in the second period and financed by a payroll tax proportional income tax in period 1 levied at rate c. The social security

programme is financed on a pay-as-you-go (PAYG) basis such as the workers' generation will receive globally pension benefits in period t+1 that will be paid out of the contributions of the next generation.

The total pension benefit the young generation (workers) will receive when they retire will be equal to the total contributions paid by the next generation (worker generation in period t+1) such that

$$P_{t+1} = R_{t+1}\overline{p} = C_{t+1} = cw_{t+1}L_{t+1} = c(1+g)w_t(1+n)L_t \quad (1)$$

Where p is the average pension level, which is a fraction of the wage earned in time t, $p = w_t q$, so that $q = \frac{p}{w_t}$; with R being the number of pensioners. Equation (1) also expresses the budget constraint that government face in each period t if PAYG balance is assumed, In fact, the left-hand side of the equation represents the pension liabilities to the old-generation and the right-hand side represents the contributions paid in the system by the workers. This equality states that the total value of benefits paid is equal to the payroll tax rate times the total wage bill. [(a)]

Dividing eq. (1) by C_t, one obtains the pension rate that retirees get out of the contributions they paid when they were workers such that

$$\frac{P_{t+1}}{C_t} = \frac{C_{t+1}}{C_t} = \frac{cw_{t+1}L_{t+1} = c(1+g)w_t(1+n)L_t}{cw_tL_t = c(1+g)w_{t-1}(1+n)L_{t-1}} = (1+g)(1+n)$$

If the contribution rate is constant and the labour force participation rate is constant this equality reduces to the standard Aaron-Samuelson condition which implies a return of approximately n+g. (equal, to the rate of growth of the wage bill).

The previous condition also suggests that slow labour force growth and slow productivity growth reduce the rate of return to contributions to a PAYG system.

The condition also implies that the rate of return in a funded pension system will be lower than that generated by a PAYG pension system if

$$(1+r) < (1+g)(1+n)$$

If the inequality is reversed, the rate of return in a funded pension system will be higher than that generated by a PAYG pension system.

A corollary to Aaron's Law is the “paradox of social insurance" which implies that an individual will receive a higher rate of return when participating in a PAYG pension scheme than by participating in a funded pension scheme. The intuition behind this paradox is the following: in a fully-funded pension scheme a generation of a size L_t finances its own retirement while in a PAYG a generation of size L_t finance the retirement of a generation of a smaller size. The paradox disappears in case of slow population growth, or in case of population decline and if there is negative growth in the real wage. This also implies that countries experiencing population ageing, low fertility and low productivity growth, pre-funded privately defined contribution pension schemes may appear a "superior" alternative

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(a) It can be shown, by rearranging the terms, that the balance static condition may equivalently be written as the equality between the contribution rates and the product of the average replacement rate and the average dependency ratio of the economy.

The Aaron Samuelson conditions set out above section relates to rates of return over time, which implicitly assumes that the pension system starts out from some sort of financial equilibrium. In that case, the objective of “sustainability” over time can be met under certain conditions for

changes in pension replacement rates relative to the rates of growth of the number employed and the number of pension recipients.[3] However, pension systems may not have a "sustainable" starting point. This can happen because of some demographic and macro-economic shocks that lead to increasing life expectancy or a very slow GDP growth. But an unsustainable starting point could also be due to too high benefits, too low retirement age and too low contributions.

The system moves then out of the steady state. To reach sustainability may require the use of different instruments for countries that are out of the steady state. They are likely to be of a corrective, rather than preventive type, with a shorter-term range for countries with unsustainable starting points.

As discussed in the next section, the standard Samuelson-Aaron conditions for the financial sustainability of a PAYG system do not apply outside the steady state (i.e. where population and wages are growing at a constant rate).

2.2 Further extensions to Aaron-Samuelson

More technical studies have explored further the Aaron-Samuelson condition (i.e. that the implicit rate of return on pension contributions should be equal to the rate of growth in average earnings plus the rate of growth of employment) and its stability in the face of changes in other variables. Some recent studies have shown that the Aaron-Samuelson condition applies only in relatively restricted and theoretical settings. Robalino and Bodor (2009), for example, argue that it holds only in long-term steady state in an overlapping-generations model with two generations (one working and one retired). They set out a range of factors that move trajectories away from steady state with significant effects on the results, including changes in retirement behaviour, mortality rates and the composition of the workforce (by age and sex).

There has therefore been a range of alternative proposals for sustainable implicit rates of return. The proposal of Settergren and Mikula (2005) depends on average-earnings growth, changes in the value of the assets in a reserve (or buffer stock) and what they term the "turnover duration" of the pension scheme. The latter is designed to measure the average length of time that contributions are in the system. (This theoretical model underlies the design of the automatic balancing mechanism in Sweden's notional accounts scheme.) Robalino and Bodor (2009), however, show that the measure of contribution revenues and turnover – designed to show the sustainable pension

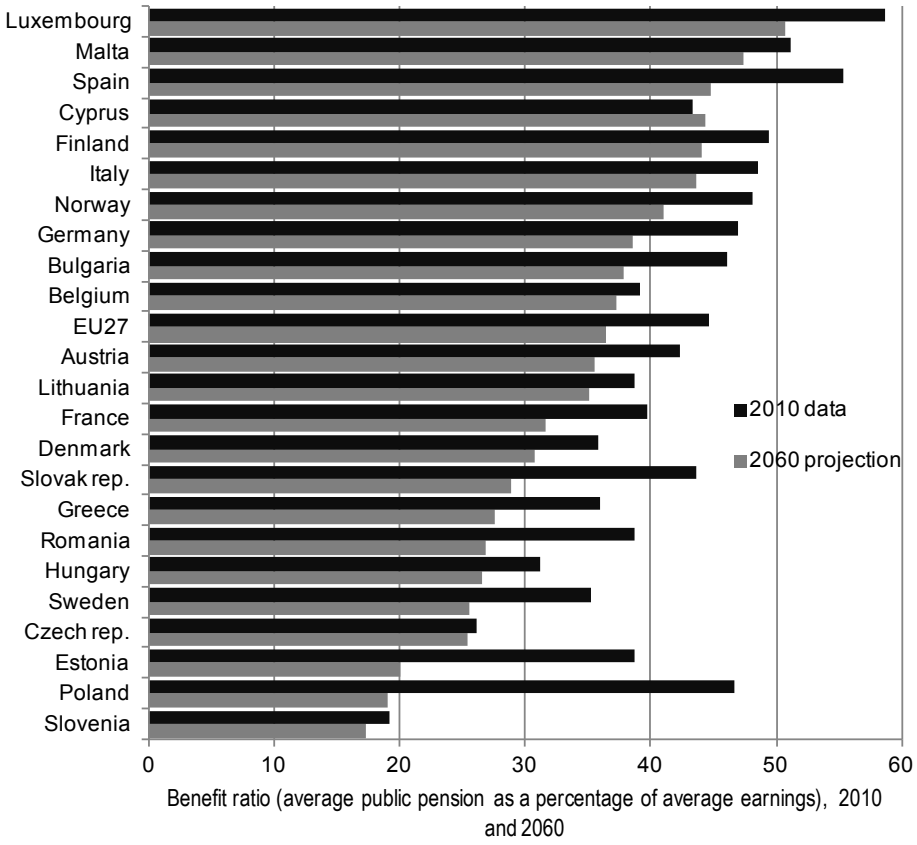
[3] In fact it is easy to show that in a PAYG system, in the hypothesis of constant total output, if the labour force shrinks, the total contributions (c*w*L) paid into the system will also decrease. A contemporaneous increase in the number of pensioners and in their life expectancy implies that the total pension bill will increase. This, clearly, might create a deficit. To maintain the balance there are two "easy" options: either to reduce the average pension or to raise the contribution rate.

liabilities that the plan can bear now and in the future – delivers results that can be, in their words, "arbitrary" and "not bullet-proof" in the presence of large changes in earnings or the coverage of the pension system. Building on the original proposal of Buchanan (1968), they propose that the government should issue GDP-indexed bonds as a kind of asset for the public pension scheme.

The OECD pension models do not calculate implicit rates of return. Instead, they can deliver some microeconomic measures – in that they consider only a range of example individuals – that are the benefit-cost ratios. These ratios show the lifetime value of benefits relative to the lifetime value of contributions. In steady state, a benefit-cost ratio of one (with the appropriate discount rate) would indicate that the system is sustainable. Although population ageing is clearly not a steady state, it is possible to produce sustainable benefit-cost ratios – adjusting for longer life expectancy and a smaller workforce – that will be below one. These calculations use the similar techniques to those based around implicit rates of return that were illustrated above.

The results for the benefit ratio are shown for EU-27 countries in Figure 4. The chart focuses on the two end points of the projection: the starting point in 2010 and the end of the forecast horizon in 2060. The EU27 benefit ratio in 2010 is just under 45%, while the simple (unweighted) average for all 24 countries shown is just under 42%. In most countries, the benefit ratio is expected to fall between 2010 and 2060 (compare the black and grey bars in the charts). The EU27 benefit ratio therefore falls from (just under) 45% in 2007 to 36% in 2060, while the simple average declines from (just under) 42% to 34% over the same period. Large reductions in the benefit ratio – or around 25-30% -- are forecast for Estonia, Poland, Romania, Slovak republic, Sweden.

Figure 4. Benefit ratio: average public pension payment relative to average earnings, per cent, 2007 and 2060



Source: European Commission (2012), Table A 81. See also Table 2.16 ibid.

However, the largest reductions are observed in some countries that have introduced mandatory private pensions as a substitute for part of public pensions (such as Estonia and Poland). Nonetheless those reductions become smaller when occupational and private schemes are included in the calculation (see European Commission, 2012).

2.3 Pay-as-you-go equilibrium

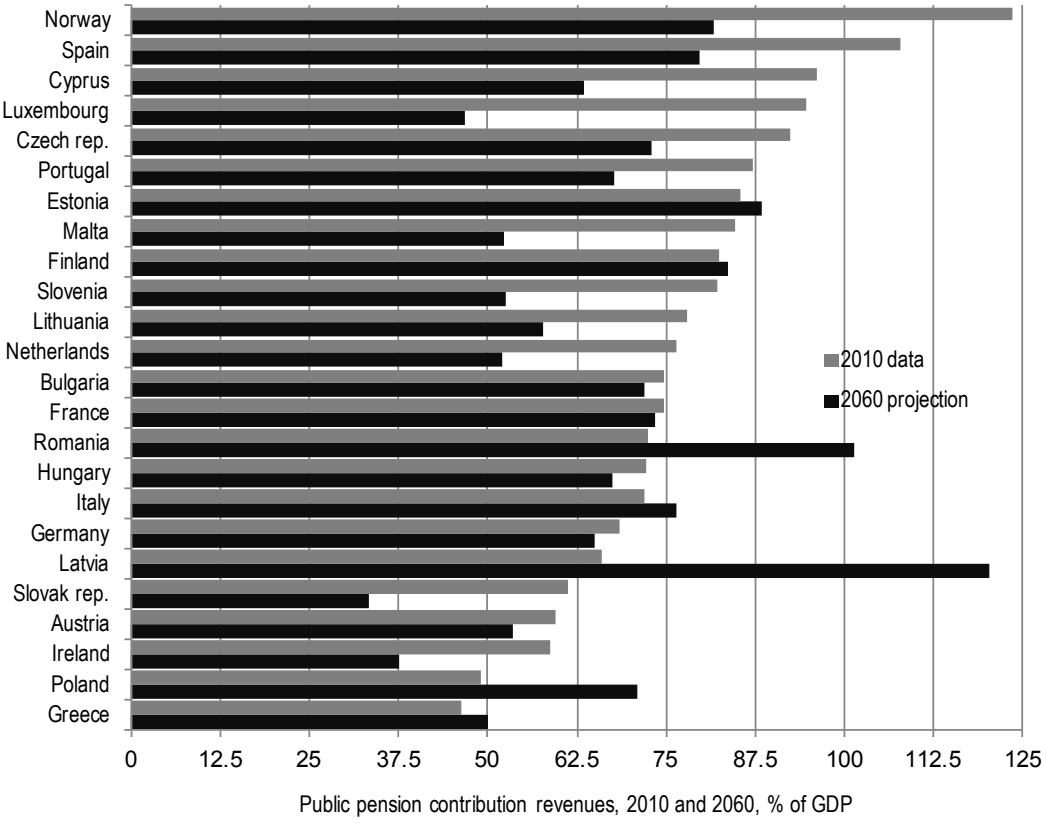
The Aaron Samuelson condition is very clearly dynamic. But the "static" situation at different points in time also matters. This is addressed by the concept of "pay as you go equilibrium". In strong form, this requires pension contribution revenues to equal public-pension expenditures in each and every period (now and into the future). In weaker form, this balance between contributions and benefits need not hold each and every year: for example, in times of recession, "automatic stabilisers" could be allowed to operate, with revenues falling short of expenditures. Equally, in times of rapid growth, contribution revenues may exceed spending. In the

weaker form, it is important that these revenues and surpluses balance over the economic cycle: i.e., the condition is imposed symmetrically in both good and bad times.

Figure 5 shows the relationship between contribution revenues and total expenditures using data for 2010 and projections for 2060. Data are not provided for Belgium, Sweden and the United Kingdom Information for Ireland may be misleading: there is no separate pension contribution, so these data probably relate to the overall social-security contribution.

In 2010, the average ratio between contribution revenues and benefit expenditures for the 25 countries shown is 75% (the grey bars in Figure 5). Looking forward to 2060 – the black bars in Figure 5 – the proportion of public-pension expenditures that will be financed by contributions is expected to fall from 75% to 65% on average. In eight countries – Denmark, Estonia, Finland, Greece, Italy, Latvia, Poland and Romania – are contribution revenues expected to grow faster than expenditures. In a few cases, there is only a small deterioration of revenues projected relative to spending: Austria, Bulgaria, France, Germany and Hungary. The changes are largest in Luxembourg and Norway.

Figure 5. Pension contribution revenue as a percentage of public pension expenditures, 2010 and 2060



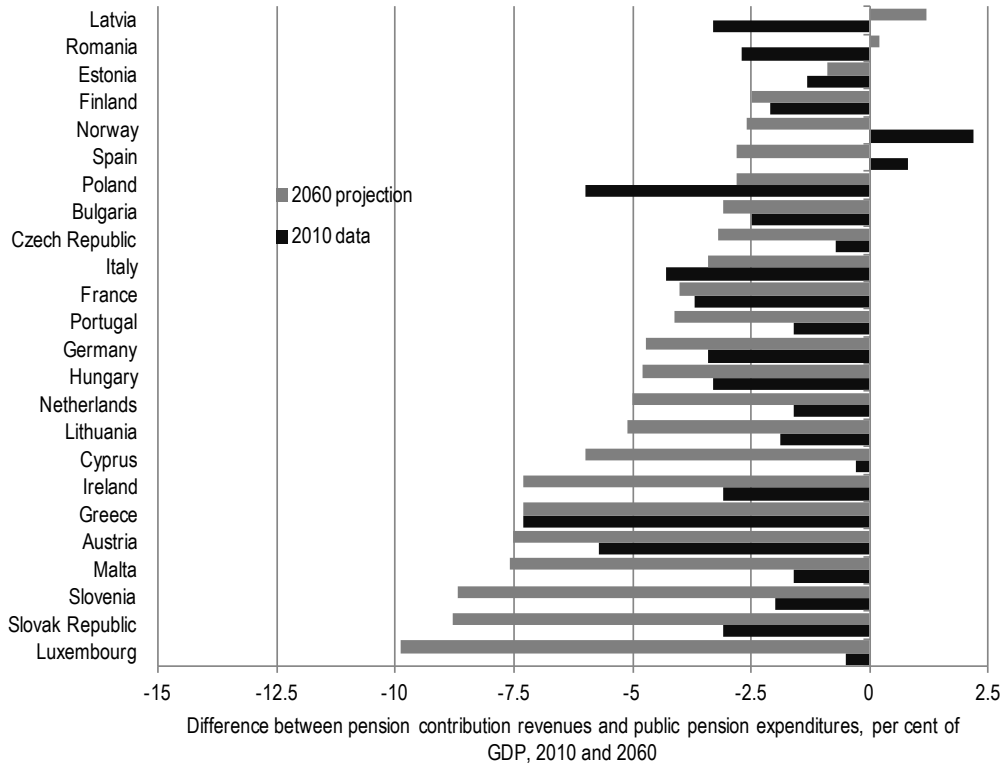
Source: Calculations based on European Commission (2012), Tables A 66 and A 75.

In some countries the fact that contribution revenues raise significantly less than pension expenditures is a sign of pay-as-you-go disequilibrium: benefit pay-outs are unsustainably high already relative to contributions paid. 10% of pension expenditures in 2060 (in addition to those already financed out of general revenues) will have to be found from sources other than contributions.

Figure 6 below shows the difference between overall revenues and expenditures in absolute terms for 2010 and 2060, normalised to GDP in both those years. In three cases – Luxembourg, Slovak republic and Slovenia – the gap between contribution revenues and expenditures in 2060 is projected to be 8% of GDP or more with a further seven countries showing a difference of between 5% and 8% of GDP (i.e. Austria, Cyprus, Greece, Ireland, Lithuania, Malta and the Netherlands). In only two cases – Norway and Spain – pension contribution revenues exceeded expenditure in 2010.

In some of these cases, the situation depicted reflects a range of explicit policies targeted to people in specific situations, such as the unemployed or those caring for children or older relatives. For example, some types of public pensions – especially resource-tested benefits or minimum pensions – are financed out of general government revenues. In others, the cost of credits for periods out of paid work – caring for children or unemployed – also come out of the general government pot. Unfortunately, it is not possible to disentangle the effects of intended cross-subsidies out of general revenues from pay-as-you-go disequilibrium in the analysis provided by the Ageing Working Group (European Commission, 2012).

Figure 6. Difference between pension contribution revenues and public pension expenditure and, percentage of GDP, 2010 and 2060



Source: Calculations based on European Commission (2012), Tables A 66 and A 75.

The distinction between "sustainability" and "affordability" is also important and relevant. This introduces some important nuances. Increases in public pension spending over time might be paid for, but only if – with pay-as-you-go schemes – younger generations are willing to shoulder a growing burden of contributions and taxes. It is unclear what exact assumptions have been used in the projections for contribution revenues, but in most cases they are based in unchanged contribution rates. Evidence on equilibrium contribution rates would very likely require an increase from the current rate needed to pay for pensions. The policy issue then becomes whether these are affordable to future workers.

For the reasons outlined above, these data cannot, in every case, be interpreted as a deficit of the pension system: some of the benefits included in the overall expenditure are explicitly financed from general government revenues. In addition to policies targeted at specific groups, e.g. the unemployed and those who care for children (e.g. Germany and Sweden) also safety-net benefits -- such as basic, targeted or minimum pensions -- are often paid for explicitly out of general revenues rather than contributions. Examples with broad coverage would include basic and means-tested schemes in Denmark, the guarantee pension in Sweden, means-tested benefits in Ireland and

the United Kingdom. Moreover, the role of different components of the pension system is likely to change over time. For example, a reduction in earnings-related benefits as a result of pension reforms is likely to increase expenditures on safety-net programmes, such as basic, means-tested and minimum benefits. A useful, comprehensive definition of sustainability must be take account both of the full range of benefits on the expenditure side and the full range of financing mechanisms on the revenue side.

2.4 Actuarial equilibrium

Instead of assessing contributions and expenditures in a single year or over an economic cycle, one can sum these over a long projection horizon. Within a PAYG system this could be achieved by linking the rate of return of the contribution of a specific cohort (and thereby the pension benefits) to the present value of future contributions. This difference between these two totals shows the "financing gap" of the pension system. If the system is in balance over the whole period, there will be surpluses or deficits (of contribution revenues versus expenditures) in most years, with one or the other persisting for quite long periods. This longer horizon has very different implications. The current balance of the pension system may be in surplus. However, population ageing may mean that pension expenditures will exceed revenues if current contribution rates were maintained. The actuarial equilibrium approach would therefore require remedial action now, while pay-as-you-go equilibrium would not.

A more "actuarial" approach, therefore, is to consider both expenditures and contribution revenues and the balance between the two over time. This approach is popular with the World Bank (see Zviniene, 2009, for example) and is a standard presentation of the results from its Prost model (the Pension Reform Options Simulation Toolkit).[4]

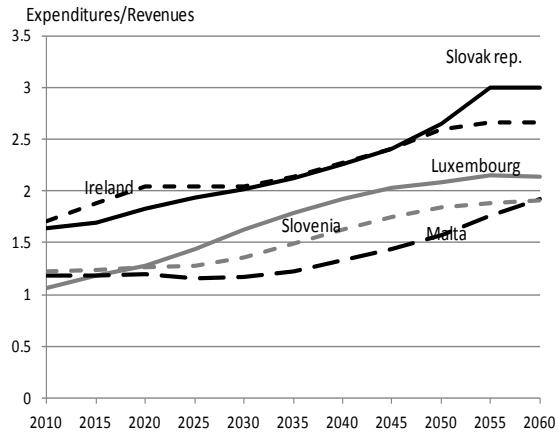
Figures 7 and 8 show the ratio of public pension expenditure to contribution revenues using data for 2010 and projections through to 2060 (based on European Commission, 2012). If the pension system is in "current balance", then contributions and expenditures would be the same and the ratio should be one. Countries have been divided into four groups based on the increase in the ratio over the forecast period, starting with the largest increases in Figure 7a and ending with the smallest increases or reductions in Figure 8b.

[4] Another favoured concept of the World Bank is "implicit pension debt" (IPD). This effectively measures the present value of the liabilities of the public pension system to pay future benefits that have already been accrued. Holzmann, Palacios and Zviniene (2004) discuss the concept in more detail and provide calculations for 35 countries. It is not possible to calculate from the data provided to the Ageing Working Group (European Commission, 2009).

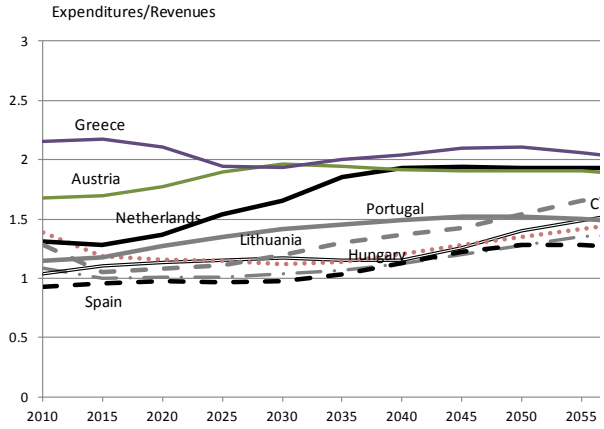
Starting with Figure 7a, pension spending is above contribution revenues in all the countries shown. However, expenditure is projected to be much higher at the end of the forecast period. In Luxembourg spending in 2060 will be well over double the revenues from contributions. In Ireland it will be over 2.5 times the revenues from contributions. Slovak republic starts with a situation of more than 50% above revenues. The deficit in the pension system is projected to worsen so that by 2060, spending in the Slovak republic reaches nearly three times revenue Or, put another way, contribution rates would need to be trebled to balance the pension system. In the countries shown in Figure 7b, pension spending will also increase over time relative to revenues. The largest increase is observed for the Netherlands where pension spending in 2060 will be almost the double of the revenues from contributions.

Figure 7. Ratio of pension expenditure to pension contribution revenue, percentage of GDP, 2007-2050

7a. Ireland, Luxembourg, Malta, Slovak republic, Slovenia



7b.Austria, Cyprus, Czech republic, Greece, Hungary, Lithuania, Netherlands, Spain



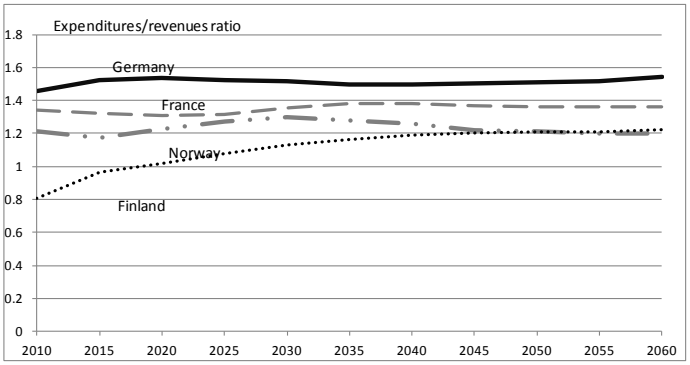
Source: OECD analysis of European Commission (2012), Tables A66 and A75.

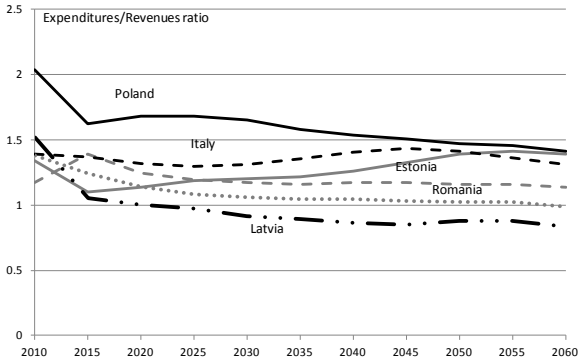
For most of the countries in Figure 8a, the relationship between expenditure and revenues is projected to be broadly unchanged over the forecast period. Finally in the countries depicted in figure 8b, there is a decrease in pension spending relative to contribution revenues. In quite a number of these cases, expenditure is significantly larger than contribution revenues.

Figure 8. Ratio of pension expenditure to pension contribution revenue, percentage of GDP, 2010-2060

8a. France, Germany and Norway

8b. Estonia, Italy, Latvia, Poland and Romania





Source: OECD analysis of European Commission (2012), Tables A66 and A75.

2.5 Conclusions

The details of the analysis of sustainable implicit rates of return are complex and are well covered in the papers cited above. However, it is important to note that these are designs for sustainable, pay-as-you-go, earnings-related pension scheme. While they are not explicitly ways of evaluating pension systems, it is possible to derive benchmarks from them for assessment.

The analysis of financially sustainable designs for pension systems is also necessarily incomplete. For example, implicit rates of return make no sense when analysing programmes that are not earnings-related, such as basic, means-tested and minimum benefits. All these approaches also impose the condition that benefits should be financed by contributions on wages. While this has conventionally been the case, there is no reason why it should be so. It makes sense to consider the two flows separately. First, what is the profile of public expenditure on pensions over time? Secondly, how should this be financed? By "contributions" or general revenues? For example, there may be concerns that pension contributions – effectively a tax on wages – may have negative effects on work incentives. It might make sense instead to finance benefits out of some other revenue source: consumption taxes, for example. Pensions are *de facto* a matter of tax and transfer policy: taxes, paid by all age groups, and transfers, paid to older people.

The most logical approach to financial sustainability involves some form of long-term actuarial equilibrium. This means that the pension system is in balance over time: the stream of contributions and other revenues over a suitably long horizon (50-75 years) is enough to pay for projected benefits over that period. However, it may be possible to use proxies for this direct measure of financial sustainability in an automatic adjustment mechanism.

3. Targets and instruments

The relevant concept – actuarial equilibrium – raises the relevant question of which instruments can be used to correct situations of "actuarial" disequilibrium? Four types of instruments might be employed:

- Adjustments in the benefit level (or the value of pension benefits), which directly reduces expenditures;
- Adjustments in pension eligibility ages, which cuts spending by reducing the duration over which pensions are paid;
- Adjustment in contribution rates, which increase the revenues of the scheme,[5] or
- Drawing on a reserve fund, providing one exists.[6]

Table 1 presents a snapshot of the different mechanisms which are illustrated in greater details in the next sections.[7] The table suggests that there are some variations on these themes. For example, contribution revenues might be increased by extending the base (raising the ceiling, levying contributions on unearned income *etc.*) rather than increasing the rate. Benefit levels can be cut in different ways: across-the board (proportionally for all) or in a targeted way (with smaller cuts for lower earners than for higher). Effective benefit cuts can be imposed on existing retirees by changing the policy for indexing pensions in payment. Benefit cuts on current workers can be restricted only to new pension accruals or applied to the rights already accrued.

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5 Governments could use other means to finance the deficit between pension liabilities and contributions (e.g. by shifting the costs on future generations, or by other government revenues such as direct or indirect taxes). But these are not properly speaking "automatic stabilisers" of pension systems. The paper will therefore not discuss these options.

6 As it will be explained in section 5, some OECD countries have set up reserve (or buffer) funds designed to help the funding of public pension schemes in "critical" times, for example when the baby boom generations will reach retirement and/or the contributors' basis will start to erode.

7 See also Annex 1 for a summary description of some of these mechanisms.

Table 1. Automatic adjustment mechanisms in pension systems

	Adjustment of benefit level			Adjustment in pension eligibility ages	Adjustment in contribution rates	Reserve funds
	Pension benefits linked to life expectancy	Valorisation	Indexation			
	1			2	3	4
Australia	●					●
Austria						
Belgium						
Canada		●	●		●	●
Chile	●					●
Czech Republic						
Denmark				●		
Estonia	●					
Finland	●					
France				●		●
Germany	●	●	●		●	
Greece				●		
Hungary						
Iceland						
Ireland	●					
Israel	●					
Italy	●			●		
Japan		●	●			●
Korea						
Luxembourg						
Mexico	●					●
Netherlands						
New Zealand						●
Norway	●					●
Poland	●					●
Portugal	●		●			●
Slovak Republic	●					
Slovenia						
Spain						
Sweden	●	●	●			●
Switzerland						
Turkey						
United Kingdom	●					
United States	●					

4. Mechanisms for implementation

4.1 The adjustments of benefit levels

Changing the accrual rate – the amount of pension earned for each year of contributions – is the most direct way of affecting benefits. But such a direct approach is relatively rare. Far more common are indirect changes to the benefit formula. In practice the adjustment factors of the benefits often depend on the behaviour of some demographic indicators (such as life expectancy and the old-age dependency ratio) or economic variables (such as growth in GDP or average earnings). However, only some of these indirect approaches can be considered as *automatic* adjustment mechanisms. Effectively, there are three main mechanisms for changing pension values.

- First, adjustments can be made in benefit levels to reflect changes in life expectancy;
- Secondly, adjustments can occur through valorisation of earlier years' earnings;[8]
- The final mechanism is through indexation of pensions in payment;

4.1.1 Adjustments to reflect change in life expectancy

Adjustments can be made in benefit levels to reflect changes in life expectancy. Increases in pensionable age (that will be discussed below), are only one policy response to the fact that people are living longer. Around half of OECD countries have elements in their mandatory retirement-income provision that provide an automatic link between pensions and a change in life expectancy (see Table 2 below for details about the countries where such links exist and the way of implementation). In the context of public schemes, these are implemented directly in some defined-benefit schemes or through adopting notional accounts. In the latter case, the annuity calculation at the time of retirement means that benefit levels *automatically* fall as life expectancy increases. In both of these cases, the implicit target is that the value of lifetime pension benefits

[8] For example in Italy, for those individuals not covered by the NDC system (i.e. those that had more than 15 years of contributions in 1992 before the reform of 2011), pre-retirement earnings are valorised according to the rules established in the law decree n. 503/1992. Namely, valorisation is based on the Consumer price index for families (of manual and non-manual workers) increased by 1 percentage point and according to the values labeled as "quota B" published by ISTAT for the periods of work carried out after 1/1/1993. Periods of work carried out up to 31/12/1992 are valorised according to the values labeled "quota A". To these latter quotas the increase of 1pp does not apply. Valorisation of contributions in the NDC scheme is based, by contrast, on the 5-year moving average of the nominal GDP growth. These days also pension indexation is being modified for those that are not covered by the NDC scheme. Pension-in- payment indexation was already modified in 2009 by moving to the application of the CPI for workers instead of the CPI computed for the retirees. These new changes are encountering strong opposition by social partners and retirees.

should remain broadly the same for the same lifetime contributions. In traditional defined-benefit schemes, in contrast, the per-period pension benefit remains the same as life expectancy increases and so the lifetime value of benefits also increases.

In other contexts, the link to life expectancy in pensions has occurred in two other ways. First, many countries have substituted mandatory defined-contribution schemes for part of public pension provision or added compulsory contributions on top of existing arrangements. Secondly, there has been a marked shift from defined-benefit to defined-contribution provision in voluntary, private pensions in countries such as Canada, Ireland, the United Kingdom and the United States and in the quasi-mandatory occupational plans in Sweden.

The rapid spread of such life-expectancy adjustments has a strong claim to be the most important innovation of pension policy in recent years. These changes have important implications for the way the cost of providing for pensions as life expectancy increases is shared. Increasingly, this will be borne by individual retirees in the form of lower benefits.

This policy has both economic and political attractions. The automaticity of adjustments means that governments no longer face bad surprises in pension financing when life-expectancy projections change. Increasing life expectancy provides a neat and logical justification for cutting future benefits that may be politically more palatable than alternative reforms that would also reduce pensions.

The pension landscape was dominated for much of the 20th century by defined-benefit schemes where pension benefits typically depend on the number of years of contribution and a measure of individual earnings. This was true of both public retirement-income provision and employer-provided private pension plans. Over the past two decades, however, this defined-benefit paradigm has been diluted. Pension systems around the world have become much more diverse. Table 2 sets out the changes that involve an automatic link between pensions and life expectancy.

The most significant reform has been the expansion of private, defined-contribution pension schemes. Because the focus of the report is on public schemes, this kind of link will not be discussed in details. However, because notional accounts schemes (also called NDC) mimic the functioning of DC schemes, it is worth to notice how the link to life-expectancy operates in reducing pension benefits – burden which is therefore entirely born by individual retirees in the form of lower pensions. When people retire in a defined-contribution plan, the accumulated contributions and investment returns must is converted from a lump sum into a regular pension payment, known as an

'annuity'. The calculation of the annuity will be based on projected life expectancy of retirees at the time of retirement. So, pension replacement rates will automatically be lower as people live longer. [9]

Notional-accounts schemes (NDC) also include an annuity calculation (see Box 2 for a description of this scheme). At the time of retirement, the accumulated contributions and notional interest is converted into a periodic payment. The rate of conversion, like the annuity rate, depends on life expectancy. This similarity between defined-contribution and notional-accounts schemes is why notional accounts have attracted the moniker of "notional-defined contribution" schemes. Four OECD countries and one EU non OECD have adopted notional accounts: Italy, Latvia, Poland, Norway and Sweden.

Box 2. Linking pensions to life expectancy: notionally defined pension systems in Italy, Sweden and Poland

In notionally-defined pension systems, each worker is assigned an individual account in which contributions are recorded but not actually paid in. The system thus remains pay-as- you-go financed. At retirement, assumptions about life expectancy are used to convert the notional capital in each account into a stream of pension payments. As life expectancy rises, for a given notional capital in each personal account the annual pension payment falls, with the aim of preserving the financial sustainability of the system. OECD countries that have introduced such systems differ, however, in the frequency with which the parameters of the notional systems are revised:

- Italy uses a "transformation coefficient", which is akin to the annuity rate in a funded defined-contribution scheme. This coefficient – which varies with the age at which the pension is claimed, with values determined according to a formula based on actuarial equivalence – is reviewed every ten years in line with changes in mortality rates at different ages.

- Poland and Sweden use an annuity divisor which is revised annually: in Sweden, the divisor is linked to individual retirement age and contemporaneous life expectancy (based on unisex mortality rates in the previous five years); in Poland, it is based on average life expectancy at retirement age.

The purpose of the switching from a "usual" PAYG toward a NDC PAYG is typically to stabilise contributions. As noticed by Scherman (2011), this implies that in "such a scheme all adjustments must be made on the benefit side, either in the accumulation phase or for pensions in payment or both. The alternative is to abandon the NDC principle."

When the contribution rate is held constant, the indexing rule will provide an automatic stabilizing device to the pension system. This kind of device is only present in the Swedish pension system. (See again Scherman 2011).

Depending on the notional rate of return used to credit individual accounts, notional defined-contribution systems will have different implications in respect to valorisation of past earnings. In Italy, contributions are up-rated in line with the five-year moving average of nominal GDP growth, and in Sweden with earnings growth; in Poland, a new rule adopted in 2004 stipulates valorisation of notional accounts in line with real growth of the wage bill (a rule that could imply, in a context of lower growth in the labour force, significant falls in pension entitlements).

It is also useful to remark that once the NDC scheme is built in such a way to be in financial balance, a traditional DB scheme, with the appropriate parameters, can mimic it.

[9] In some countries – such as, Poland, the Slovak Republic and Sweden – defined-contribution schemes have replaced all or part of the public, defined-benefit pension scheme. Further details can be found in OECD (2011) and Whitehouse (2007, 2009).

Table 2. Different ways of linking pension benefits to life expectancy

	Mandatory defined-contribution plan	Notional accounts scheme	Benefits linked to life expectancy	DB-to-DC shift in voluntary private provision
Australia	●			
Austria				
Belgium				
Canada				●
Chile	●			
Czech Republic				
Denmark				
Estonia	●			
Finland			●	
France				
Germany			●	●
Greece				
Hungary				
Iceland				
Ireland				●
Israel	●			
Italy		●		
Japan				
Korea				
Luxembourg				
Mexico	●			
Netherlands				
New Zealand				
Norway	●	●		
Poland	●	●		
Portugal			●	
Slovak Republic	●			
Slovenia				
Spain				
Sweden	●	●		●
Switzerland				
Turkey				
United Kingdom				●
United States				●

Note: DC=defined-contribution; DB=defined-benefit

Source: OECD (2011), *Pensions at a Glance 2011, Retirement-Income systems in OECD and G20 countries*.

4.1.1.1 An illustration of the impact of life-expectancy link on pension entitlements

To illustrate the effects of life-expectancy links in alternative scenarios of mortality between 2010 and 2050, pension entitlements have been calculated for three benchmark countries. The five scenarios are the median of the distribution of outcomes, the upper and lower quartiles and the 1st and 99th percentiles (see Table 3). The two key measures of entitlements are replacement rates and pension wealth.

Table 3. Life expectancy and annuity factors: baseline data for 2010 and alternative projections for 2050

Baseline	UN	OECD projection for 2050

	projection		by percentile of the distribution of projected mortality rates				
	2010	2050	1st	25th	50th	75th	99th
Life expectancy at age 65 (years)							
Men	16.9	20.0	23.2	21.6	21.0	20.4	18.9
Women	20.5	24.0	26.9	25.5	24.9	24.3	22.9
Change from 2010 baseline (years)							
Men	*0.0*	*+3.1*	*+6.3*	*+4.7*	*+4.1*	*+3.5*	*+2.0*
Women	*0.0*	*+3.5*	*+6.4*	*+5.0*	*+4.4*	*+3.8*	*+2.4*
Annuity factor at age 65							
Men	13.7	15.7	17.7	16.8	16.4	16	15.1
Women	16.1	18.3	20	19.2	18.8	18.5	17.7
Unisex	14.8	16.9	18.8	17.9	17.5	17.1	16.2
Change from 2010 baseline (per cent)							
Men	*0.0*	*+14.6*	*+29.4*	*+22.4*	*+19.4*	*+16.6*	*+9.9*
Women	*0.0*	*+13.7*	*+24.4*	*+19.3*	*+17.0*	*+14.9*	*+9.7*
Unisex	*0.0*	*+14.2*	*+27.0*	*+20.9*	*+18.2*	*+15.7*	*+9.7*

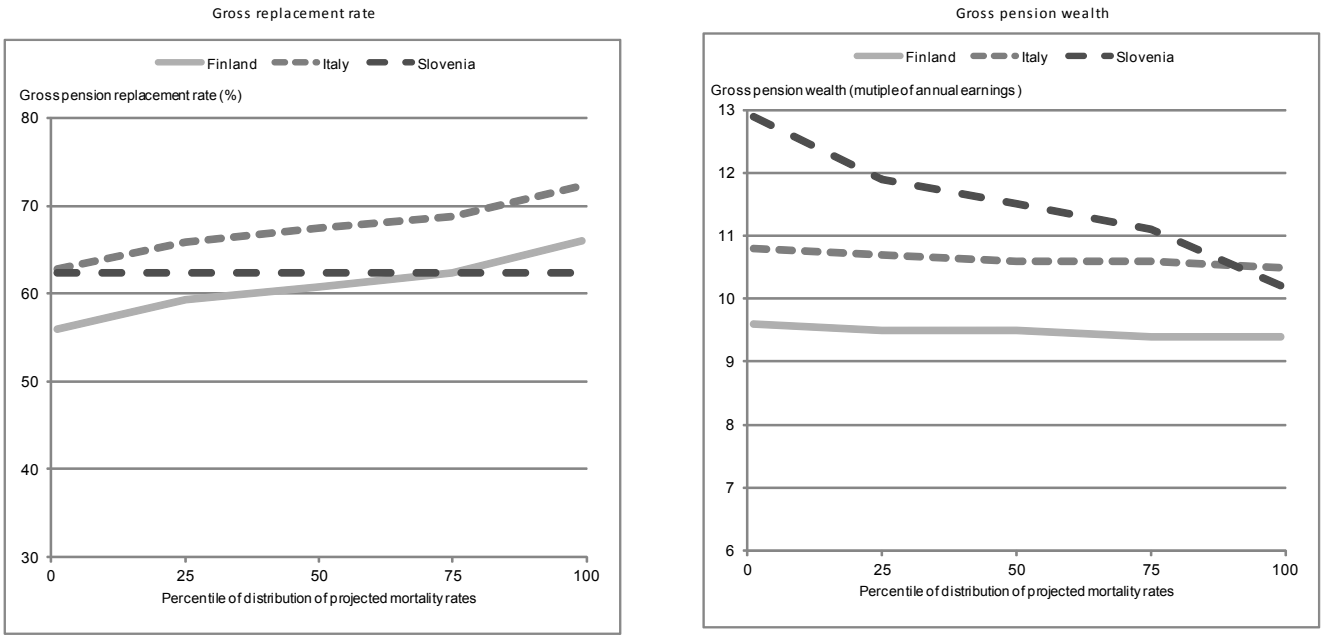
Source: OECD (2011)

The three example countries are Italy, Finland and Slovenia. Italy has notional accounts. The other two countries have public defined-benefit schemes: with adjustments for life expectancy in Finland and without in Slovenia.

The left-hand chart in Figure 9 shows the replacement rate under the different mortality scenarios. All the results are for a man on average earnings. With Slovenia's defined-benefit plan, the replacement rate is constant at 62%. But in the other three cases, replacement rates are lowest at the highest life expectancy (1st percentile of the distribution) than they are with low life expectancy (99th percentile). In Finland, for example, the replacement rate is 56% with the lowest mortality rates and 66% with the highest. Pension wealth is shown in the right-hand chart of Figure 8. In Slovenia, pension wealth is nearly 13 times annual earnings in the high life expectancy scenario but just over ten times with low life expectancy. In Chile, pension wealth is constant under the different scenarios for mortality rates. There is a slight decline in pension wealth as mortality rates increase in Finland and Italy, but this is substantially shallower than for Slovenia. For example, pension wealth is higher in Slovenia than Italy in most cases, but if mortality improvements were especially slow, Italy would show higher pension wealth than Slovenia.

Under a pure defined-benefit plan, replacement rates are constant while pension wealth varies with life expectancy. This is illustrated by the Slovenia case. Under a pure defined-contribution plan, the reverse is true: pension wealth is constant but the replacement rate varies with life expectancy. This is close to the picture for Finland and Italy.

Figure 9. Pension entitlements under different life-expectancy scenarios: Man with average earnings



Source: OECD (2011), Pensions at a Glance 2011.

In theory the individuals' response to the reform should be that of working longer, but this outcome is in practice uncertain. Table 4 gives some indication of the extra length of work required for selected countries with a link to life expectancy in their mandatory retirement-income provision. It shows the current normal pension age and, using different projections for life expectancy in 2050, the age of claiming the pension that would deliver the same benefits.

In Finland, for example, the current normal pension age is 65. Under the median mortality scenario, an individual would have to work to age 66.3 years. The extra work adds to annual benefits in three ways: additional contributions, extra investment returns on accrued pension capital and a shorter duration of retirement. In the low-mortality scenario, however, work until age 68.0 would be needed to maintain benefits, while a pension age of 65.9 would be sufficient in the high-mortality scenario. This pattern is broadly replicated in other countries, such as Italy, Poland and Sweden. The extra years needed between 2010 and 2050 from Norway's current normal pension age of 67 are also similar. Typically, just less than one extra year's work will deliver the same benefit as 2010 under the high-mortality scenario, 1.5 years' in the median case and around three years with the most rapid mortality improvements.

Table 4. Pension ages needed to equalise benefits in 2010 and 2050 under different mortality scenarios: man on average earnings, selected countries

	Current normal	Pension age delivering equal replacement rate in 2050

	pension age	Low mortality	Median mortality	High mortality
Finland	65	68.0	66.3	65.9
Italy	65	67.7	66.2	65.9
Norway	67	69.8	68.3	67.9
Poland	65	67.9	66.3	65.9
Portugal	65	66.8	65.5	65.5
Slovak Republic	62	63.4	62.7	62.4
Sweden	65	68.2	66.4	66.0

Source: OECD (2011)

In the Slovak Republic, the extra years of work are smaller, reflecting the significance of elements of the pension package not linked to life expectancy. In Portugal, the extra years of work needed to offset life-expectancy related reductions in benefits are also small. This reflects the large increments to accrued benefits for people working after normal pension age. This can be as high as 12.0%, well above the OECD average of 4.8%.

4.1.2 Adjustments through valorisation

Valorisation is implemented to reflect changes in costs and standards of living between the time that the pension entitlement was earned and when it is drawn. Valorisation of past earnings may not seem obvious in pension systems, but its impact on retirement incomes is large. This is a result of the compound-interest effect. A generic example illustrates the impact of changes in valorisation policy. Assuming growth of 2% a year in real wages and price inflation of 2.5%, then nominal earnings grow by 4.55% a year. For a full-career worker (*i.e.*, someone working from age 20 to 65), valorising past earnings with prices results in a pension benefit on retirement that is 40% lower than a pension resulting from valorisation in line with economy-wide average earnings. This is due to a "compound-interest" effect: when their past earnings are revalued, workers lose out each year of their career compared to the evolution of their wages.

Valorisation policy, therefore, has important implications both for adequacy and sustainability of pension systems. Financial sustainability is improved by a move to a less generous valorisation procedure. The distributional impact is complex. People with steeper age-earnings profiles (who tend to have higher lifetime earnings) will lose less from a shift from wages to prices valorisation than those with relatively constant real earnings. This is because prices valorisation puts a lower weight on earlier years' earnings (which are less important for a worker with a steep age-earnings profile) than does earnings valorisation. This is the reverse of the effect of extending the period over which earnings are measured to calculate benefits.

The majority of OECD countries with earnings-related schemes valorise past earnings in line with economy-wide wage growth. However, several countries have moved away from earnings

valorisation in recent years. For example, valorisation for the public scheme in France is now to prices. The policy in the main second pension for private-sector workers of increasing the cost of a pension point in line with earnings and the value of a point in line with prices has the same effect on benefits as price valorisation (see Queisser and Whitehouse, 2006 and Box 3). Finland and Portugal will valorise pensions to a mix of price inflation and earnings growth.

As it is illustrated in Box 3 below, the policy on the notional interest rate in notional-accounts schemes and for uprating the value of a pension point with points schemes are exact equivalents. Different choices of variables have the same effect in the different types of systems. This procedure has an obvious parallel with the Aaron-Samuelson condition discussed above. As a first stage, for example, one might move from wages to wage-bill valorisation (i.e., changes in average earnings plus changes in employment). However, one can modify this mechanism further so that larger adjustments in valorisation take place to move the system closer to financial equilibrium.

Box 3. Relations between different types of pension schemes

Publicly provided, earnings-related pension schemes follow three broad types. It is useful to compare the inter-relationship between the three using some basic algebra. Issues are here simplified by using simple, generic versions of the three different scheme types: defined-benefit, points, and notional accounts.

All three types of scheme are found in OECD countries. More than half of OECD countries have public defined-benefit schemes and in a further three, private defined-benefit plans are either mandatory or "quasi-mandatory" (*i.e.*, they achieve near-universal coverage through industrial-relations agreements). Four OECD countries have points schemes and three have notional accounts. In seven countries, there are no public or mandatory private earnings-related schemes. Of these, three have mandatory or quasi-mandatory defined-contribution provision while two have no compulsory public or private arrangements for providing income replacement in retirement, relying instead on basic schemes.

A simple defined-benefit plan pays a constant accrual rate, *a*, for each year of service. It is based on lifetime average revalued earnings. The pension benefit can therefore be written as:

$$DB = \sum_{i=o}^{R} w_i (1+u)^{R-i} a$$

where *w* are individual earnings in a particular year (indexed *i*), *R* is the year of retirement and *u* is the factor by which earlier years' earnings are revalued. In most OECD countries, this is the growth of economy-wide average earnings.

In a points system, pension points are calculated by dividing earnings by the cost of the pension point (*k*). The pension benefit then depends on the value of a point at the time of retirement, *v*. Thus, the pension benefit can be written as:

$$PP = \sum_{i=o}^{R} \frac{w_i v_R}{k_i}$$

A significant public-policy variable is the policy for uprating the value of the pension point, shown by the parameter *x* in the equation below. By re-writing the pension-point value at the time of retirement as a function of its contemporaneous value, the equation becomes:

$$PP = \sum_{i=o}^{R} \frac{w_i v_i}{k_i} (1+x)^{R-i}$$

In notional accounts, the inflow each year is wages multiplied by the contribution rate. The notional capital is increased each year by the notional interest rate, n. At retirement, the accumulated notional capital is divided by a notional annuity factor, *A*, sometimes called the g-value. The pension benefit can be written as:

$$NA = \sum_{i=o}^{R} \frac{w_i c}{A} (1+n)^{R-i}$$

If the policy for valorising earlier years' earnings is the same as the uprating procedure for the pension point and the notional interest rate (*i.e.*, $u = x = n$), then the structure of the three equations is very similar. In this case, the accrual rate under a generic defined-benefit scheme (*a*) is equal to the ratio of the pension-point value to its cost (v / k) and to the ratio of the notional-accounts contribution rate to the annuity factor (n / A).

Sweden and Germany adjust the incomes before (but also after) retirement according to the average wage growth, while other countries have less generous valorisation procedures. Using the rate of per capita wage growth rather than the rate of total wage growth makes it possible for benefits to grow faster than the wage base that finances them. This may happen when the labour force declines.

The automatic balance mechanism introduced by the 2004 reform in Japan tries to account for the demographic shocks from an ageing population. It is made of two components: (i) one concerns the valorisation procedure; and (ii) the second concerns the indexation of pensions in payment. Before the introduction of this mechanism past earnings were valorised in line with average wages until the beneficiary attains the age of 65. After the age of 65 the benefit was indexed in line with inflation. The mechanism acknowledges the role exerted by declining fertility rates (which potentially reduce the base of contributors) and increasing life expectancy (which increases the period over which pensions are paid) on the cost of PAYG system. Thus, valorisation and indexation procedures are modified taking into account the rate of decline of active contributors and the yearly rate of increase in life expectancy at age 65: the "modifier" is subtracted from the valorisation/indexation factor. The modifier is equal to the rate of decline of active participants in social security pension schemes plus the yearly rate of increase in life expectancy at age 65.[10] If the financial equilibrium is achieved with this mechanism, the system reverts to the situation without the modifier.

[10] For the increase in life expectancy an approximation is used, i.e. a constant adjustment of 0.3 percent per year.

4.1.3 Adjustments through indexation of pensions in payment

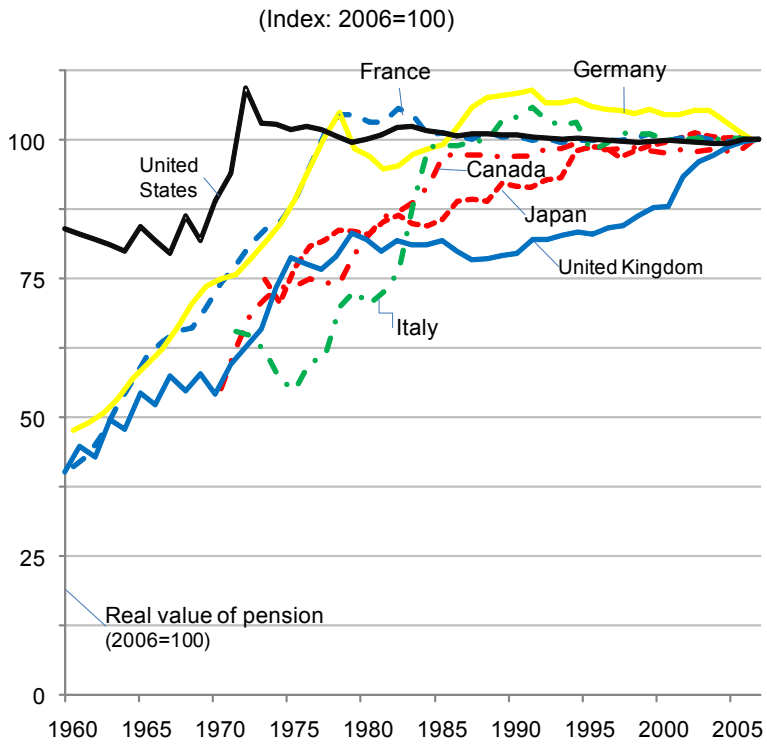
In some cases, there is a link between valorisation (i.e., pre-retirement indexation) and post-retirement indexation. As a matter of fact, indexation of pensions in payment is therefore another instrument that allows for the adjustment of benefits level.

Changes in the indexation of pensions during retirement have featured in many reform packages. Most of these involve a move to a less generous procedure to reduce costs. For example, Hungary used to index pensions to earnings growth, but moved to a 50:50 split of earnings and price indexation in the reform of the late 1990s. To plug the government's growing deficit resulting from the crisis, it has now movedfully to price indexation, although above-inflation rises in pension payments will take place if economic growth is rapid.[11]

However, governments frequently override indexation rules. Often, this appears to operate in a pro cyclical way: pension increases are larger than the rules require when the public finances are healthy while increases are postponed or reduced in times of fiscal constraint. Figure 10 shows the history of pension adjustments in the seven major economies, going back to 1960 where data are available. (Data for many more countries are presented in section V.3 below.) For ease of comparison across time, changes in pension values have been converted to an index fixed at 100 in 2006. It is important to note that this chart does not show the average pension received by retirees in a particular year. The aim is to isolate the effect of indexation policies and practices on pensions from financial and economic conditions, pension reforms and so on.

[11] Other countries that have changed indexation policy for pensions in payment have all moved to a less generous policy (provided real earnings are growing). These include Finland (from 50:50 between earnings and prices to 80% prices and 20% earnings), France (wages to prices), Poland (various changes, most recently from 20:80 earnings and prices to purely prices) and the Slovak Republic (fully to wages to 50:50 wages and prices).

Figure 10. Impact of indexation practice on real value of pensions in payment



Source: Whitehouse (2009).

Although, the indexation is a common practice, only in a limited number of OECD countries – Canada, Germany, Japan, Portugal and Sweden – indexation is "explicitly" related to the sustainability of the system. Some of these countries' practices are examined in the remaining of the section.

For example, in Canada, when an increase in contribution rates occur (see section 3.3 *infra*), the indexation of pensions in payment is frozen for three years until the publication of the next actuarial report and the reassessment of the pension plan.

In Sweden, in addition to the life-expectancy link embedded in the calculation of the annuity, indexation of pensions in payment tries to ensure that the solvency of the system is maintained. Pensions in payment are indexed on real wage growth: they are adjusted according to the notional interest rate minus 1.6% (with 1.6% representing an assumption for the long-run growth of real earnings). If real wages grow at this pace, benefits are simply adjusted by the inflation rate. If real wage grow at a slower pace (less than 1.6%), the annuity will grow more slowly than inflation and in the opposite case, the annuity grows faster than the inflation. That way, pensioners share some of the economic fluctuations with workers: in case of recession, pensioners however will see the indexation of their pension benefits reduced.

This mechanism alone however does not grant the solvency of the system. In fact, fertility rates and the size of the labour force play an important role in this respect. As a matter of fact, indexation of pensions-in-payment may also be "modified" by the "brake" built-in the Swedish pension system that is triggered by the evolution of the "balance ratio". The balance ratio is computed as the ratio between the sum of the (current market value) of the buffer funds and the "contribution asset" and pension liabilities. [12] The ratio is computed on a three-year moving average to smooth temporal variations (Kőnberg, Palmer, and Sundén 2005).

When this ratio is less than one, the "brake" automatically reduces the interest rate used to calculate accruals in the individual notional account and reduces by the same amount the indexing rate of pensions in payment. These lower rates of accrual and indexation continue until financial balance is restored. Conversely, if the balance ratio recovers and moves above one, the opposite adjustments should be observed: higher rates of accrual and indexation. Clearly, all of the adjustment occurs on benefits and the accrual of benefits while the level of contributions does not change

This mechanism is expected to work with stationary population and therefore may not be suited to situations with continuously declining population as it is the case at present in most OECD countries. Moreover, recent studies show that one of the objectives pursued with it, i.e. to provide a clear and transparent information and to prepare the public, is not achieved in practice (see Scherman, 2011).

Other mechanisms in place in other countries (such as those in Japan and Germany) try to account for population ageing. In Japan, for example, the "modifier" is subtracted from the indexation rate (see Sakamoto 2005). This correction is expected to reduce the indexation rate by 0.9 percentage points per year on average. A corollary of this adjustment of the indexation rate will be the reduction of average replacement rate from 59% in 2004 to 50% by 2023. Differently from Germany, this factor only applies to benefit and not to contribution rates. Moreover if inflation declines or if per capital disposable income declines, the nominal value of the benefits will be maintained. [13]

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[12] The contribution asset in a given year is the result of the product of contribution rates by the expected turnover duration. The turnover duration is computed as the difference between the earnings-weighted average age of persons contributing to the system and the pension-weighted average age of beneficiaries receiving annuities from the system. This expected turnover duration represents the average number of years that during which the system can finance current pension liabilities. At present, evidence shows that the expected turnover duration amounts to 32.3 years.

[13] The law contains a provision to override the automatic stabiliser.

In Germany, the sustainability factor introduced by the 2004 reform is a part of the mechanism that modifies pension benefits in relation to the system dependency ratio. The system dependency ratio accounts for demographic and economic factors. In fact, it is the ratio between the number of pensioners to the number of non-pensioners, i.e., the contributors plus the unemployed (Bőrsch-Supan and Wilke 2006). In addition to adjust for the differential situations of contributors and beneficiaries the sustainability factor is linked to an "equivalised" measure of contributors to pensioners (e.g. two contributors on low earnings might be considered as one equivalised contributor). If this ratio increases over a year, the indexation rate of the pension benefits is reduced but the reduction is not fully applied. The reduction is determined by a sustainability parameter which tries to share the burden of pensions between the retirees and the workers. If the sustainability factor were equal to one the burden would be borne by pensioners alone, conversely if it were equal to 0 the burden would be borne by workers alone. The factor is now equal to 25%.

In many cases, changes in the indexation mechanisms mean that the purchasing power of pensions is preserved, but that pensioners are not participating in the increasing standards of living enjoyed by workers. When poverty thresholds are set in relation to household income, price indexation leads to higher relative poverty rates among pensioners as the economy grows.

This is not, of course, a comprehensive list of all the ways in which benefits may be reduced. However, these are the only ways that can be used as an automatic-adjustment mechanism.

4.2 Pension eligibility ages

Increases in pension eligibility ages – the second instruments to achieve "actuarial equilibrium" have become increasingly common: more than half of OECD countries are increasing ages for national pension schemes.[14] In most cases the increases are expected to take place according to schedules fixed by the law. Normal pension ages will vary between 60 and 68 in OECD countries once reforms are fully in place, with an average of 65.2 years.

In the context of defined-benefit schemes, there are two unambiguously positive effects from increasing pensionable age. First, the benefit will be paid for a shorter period and so the cost over the individual's lifetime is lower. Secondly, people working longer will pay more in contributions. Offsetting this, the extra pension component of social contributions will mean that people will usually have a larger benefit entitlement. The degree of offset depends on the implicit return on those contributions. If a system pays a high return, then the cost of the extra benefits will

14. See Chomik and Whitehouse (2010) and OECD (2011), Part I.1.

outweigh the extra pension contribution revenues over time. (There are other taxes and contributions that still benefit the public purse, but the focus here is just on the pension system.)

With notional accounts and defined-contribution plans, the relevant pension schemes' finances are unchanged with an increase in pension age. The shorter benefit duration is reflected automatically in a higher per-period benefit. Furthermore, the additional contributions match the additional accrual of benefits (exactly in the defined-contribution case and under certain assumptions of "actuarial fairness" in the case of notional accounts: see Queisser and Whitehouse, 2006).

In all three categories of scheme, there may be an offset to expenditure savings from a higher pension age. This is because people who would have retired on an old-age pension may now effectively leave the labour market early through other pathways, such as unemployment, long-term sickness or disability benefits. These effects are difficult to quantify. Working in the opposite direction, people working longer and accruing higher benefits might reduce the burden of paying safety-net benefits to retirees who had low earnings.

This measure addresses both contribution period and the time over which the benefits are paid.

4.2.1 Linking pensionable age to life expectancy?

A link between benefit levels and life expectancy predominate in the pension reforms of OECD countries as it has been discussed previously. Advocates of these reforms have argued that individuals will respond by working longer as successive cohorts live longer and benefits for a given retirement age are consequently lower.

After all, living longer is desirable. A longer life and a larger lifetime pension payout due to increased life expectancy confer a double advantage. Some link between pensions and life expectancy is therefore optimal. It is hard to see why people approaching retirement should not bear at least some of the cost of their generation living longer than previous generations.

The question then is: should all of the cost of longer lives be shifted onto new retirees, in the form of lower benefits or a requirement to work longer for the same benefit? The issue is complex because each individual has a lifecycle that includes periods as a contributor and as a beneficiary. There is a trade-off: greater certainty over retirement age and/or benefits versus greater

certainty over the amount of contributions or taxes paid when working. The optimum is therefore unlikely to be a 100% link between pensions and life expectancy.[15]

However why have countries overwhelmingly chosen to link benefit levels to life expectancy rather than pension age? If people simply continue to retire at the same age as present, then benefits will fall as life expectancy grows. The idea is that people will work longer to make up the shortfall. However, there is no mechanism in place to ensure that they do so.

A link of pension age to life expectancy should surely make at least as much intuitive sense to voters as a benefit link. It is also much better suited to countries with redistributive public pension programmes, such as Belgium, the Czech Republic, Canada, Ireland, Korea, and the United Kingdom. The OECD's periodic Economic Surveys of member countries recommended a link between pension ages and life expectancy in ten of the 17 that addressed retirement-income policy (including Belgium, the Czech Republic, Hungary, the Netherlands, Slovenia and the United States). Reflecting the concerns expressed above, Poland and Sweden – with notional accounts and defined-contribution schemes – were advised in addition to increase pension ages in line with life expectancy. Only in the Slovak Republic and Slovenia was it proposed to have either pension ages or benefit levels linked to life expectancy.

On balance, a link between pension ages and life expectancy, rather than benefit levels, may be preferred. This device, can, however, act in concert with benefit links in notional accounts, defined-contribution plans and through adjustments in other earnings-related schemes. The policy is most pressingly needed in countries with relatively high public pensions, where benefit levels are not linked to life expectancy and there are no plans to increase pension ages at present.

Among OECD countries Denmark, has provisions that allow the retirement age to be indexed in line with the increases in life expectancy after an initial increase of the retirement age to 67. The eventual increase will result from a review of life expectancy done on five-year intervals starting from 2015. However, previous approval of the Danish Parliament is required to any increase in the retirement age. Other countries have put in place gradual increase in the retirement age which are however temporary and not "concretely" automatic.

Greece (2021) and Italy (2013) will have by contrast retirement age indexed on life expectancy starting at the dates mentioned.

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[15] In PAYG schemes, the rates of return on pensions' contributions fall as the system matures. This implies that the first generation of retirees in a PAYG system receives a windfall gain by obtaining a pension without having to pay full contributions. It has been shown that this situation may worsen as population, labour force and productivity decline.

Yet in France there is the idea of maintaining constant the ratio between the duration of activity and duration of retirement (2/3 and 1/3) which eventually would lead to increase in retirement age as life expectancy increases. While these incentives are interesting approach that may increase the effective retirement age, they could not be classified as self-adjustment mechanisms.

4.3 Contribution rates

The third instrument mentioned is designed to generate extra revenues for the pension system through increases in contribution rates. However increases in the contribution rate are very often unpopular measures.

With a national defined-benefit scheme, such a change has the expected, positive effect on the scheme's finances. With notional accounts and defined contribution plans, however, this is not the case. There is a short-term boost to government revenues under notional accounts, for example, but this will be balanced by a broadly equivalent increase in future benefit expenditures (again, depending on the degree of "actuarial fairness" in the detailed design of the scheme).

There are, however, potential offsets in economic behaviour in all cases: national defined-benefit, defined-contribution and notional-account plans. Higher employee contributions will have the effect of an increase in taxes and may therefore reduce labour supply. Higher employer contributions increase employers' labour costs and so may reduce labour demand. In both of these cases, employment will be lower, offsetting some of the revenues raised by higher contributions.

As noted before, most countries have ruled out increases in contribution rates explicitly or implicitly (by adopting notional accounts). However, there are some examples where changes in contribution rates are used in combination with measures on the benefits side of the equation.

Three countries have mechanisms in place to increase contribution. In one country, Japan, this mechanism is temporary: in fact contribution rates will increase until 2017 In Canada, contribution rate may be increased conditional on (i) the Canada Pension Plan shows in its actuarial report that the legislated rate is lower than the minimum contribution rate required for the sustainability of the plan; and (ii) that the federal and provincial ministers do not reach agreement on an alternative solution.

In Germany the sustainability factor is not used only to index initial benefits but also to increase contribution rates.

5. Automatic adjustment mechanisms and the use of a buffer fund

Most of the mechanisms in practice are based on current variables, such as life expectancy at the normal pensionable age, the system dependency ratio (number of pensioners relative to number of contributors), growth in average earnings, employment or GDP. Only in two cases (Sweden and Canada) are long-term projections of the finances of the pension system taken into account. This difference in the timing over which the assessment of financial sustainability is made is crucial. For it is only if the future financial path of the pension system is taken into account that preparations can be made now for anticipated changes, such as population ageing. In other cases, much of the remedial action occurs later: when current workers claim their benefits, for example. There is also an argument about the sharing of risks and financial burdens between different generations.

Some earnings-related schemes are pre-funded. In theory, all the different types could be financed in one of three ways:

- by full funding, where the aim is to have assets equal to the present value of liabilities;
- by partial funding, where there are assets but these are less than liabilities by design; or
- on a pay-as-you-go basis, where current revenues pay current benefits and there are no assets).

For example, public, defined-benefit schemes are partially funded in Canada and Finland. They are pay-as-you-go financed in about half of OECD countries, including Austria, Belgium, Greece and Italy. The former point-scheme in Norway was pre-funded, for example, but pay-as-you-go financed in Germany. Notional accounts are partially funded in Poland and Sweden but pay-as-you-go financed in Italy.

Public schemes are often financed from employer and employee social security contributions (i.e., taxes on wages) or from general government revenues. On average in OECD countries, contributions for public pensions raise revenues of about 70% of public expenditure on pensions. Thus, in most cases, there is some element of general revenue finance of benefits.[16]

Nevertheless, half of OECD countries have built up public pension reserves to help pay for state pensions in future. (See Figure 11 below for the list of the countries having public pension

[16] See the indicators of 'Public expenditure on pensions' and 'Contributions' in OECD (2011) or their equivalents in OECD (2009).

reserves). In these countries, public pension reserves were worth nearly 10% of GDP on average in 2009, some US$ 5.4 trillion.

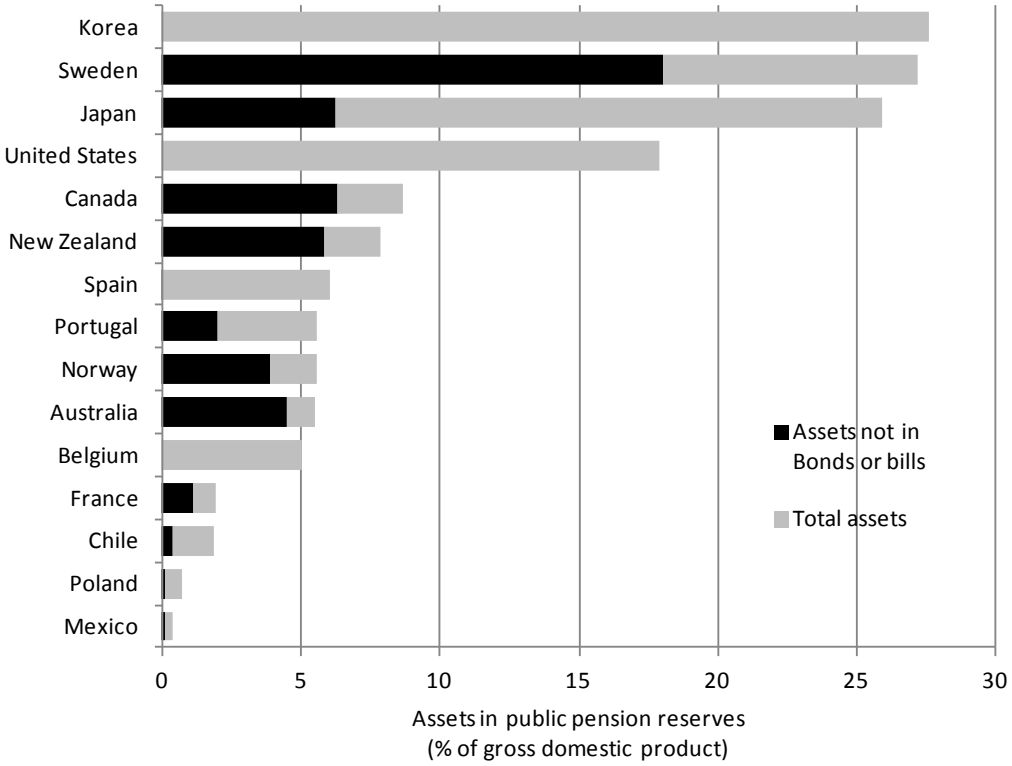
"Pre-funding" with public reserves tries to avoid some problems that might otherwise occur. First, they are used to prevent contribution rates from rising too high in the future. Second, to prevent a worse treatment of large cohorts of retirees (e.g. the baby boom generation); and third, an excessive reduction of the benefits provided by PAYG pension schemes, that would be necessary to maintain a balanced budget in the absence, for example, of an increase in the contribution rates. Different options are possible to set up and feed public reserve funds.

In France, the Pension Reserve Fund (FRR) was introduced in 1999 and is fed by different sources of revenues (e.g. taxes but also the surplus of the National Old-Age Insurance). In the Netherlands, the reserve fund AOW was created in 1997. It is fed by the surplus of the fiscal year fiscal year. Both funds are expected to contribute to pensions financing from 2020. In the case of Sweden, a mechanism for pre-financing has been "inherited" from the past. Indeed, the "old" pension system had accumulated since the 1960s large reserves. Even if the main purpose of these funds was not that of creating a pre-financing mechanism, a significant portion of the funds is still available.

In the United States, the Social Security Act of 1935 created the OASDI (Old Age, Survivors and Disability Insurance). The surpluses of the system have fed the reserve fund and are mainly invested in special Treasury bonds. According to projections, the reserves should consistently decline after 2015.

Figure 11 shows how these reserves are distributed between countries. More than half of the total is accounted for by the social-security trust fund in the United States, although, relative to national income, that reserve is smaller than those of Japan, Korea and Sweden.

Figure 11. Assets in public pension reserves, 2009, per cent of GDP



Source: OECD (2011). See also OECD (2012) *Pensions Outlook,* forthcoming.

The chart illustrates one important caveat in assessing the degree of pre-funding of pension liabilities. The light-grey bars show the assets invested in bonds and bills, most of which are issued by the government. Indeed, in many cases, such as the United States, all of the so-called assets of the reserves are government IOUs. This is pay-as-you-go financing of pensions, with some added accounting tricks. Instead of the government promising to pay pension benefits in future, they come from repayment of these IOUs. There is absolutely no difference between the two.

The black bars in Figure 11 show the assets of pension-reserve funds, taking account of this circular pay-as-you-go financing. A lot of them, including the United States; reserve fund, disappear. Overall, an average of 60% of these reserves is invested in bonds and bills. The residual, apart from bonds and bills, is worth just 3.7% of GDP on average. That amounts to less than six months of pension spending. Moreover, the other OECD countries have no public-pension reserves.

Far more significant in the pre-funding of pension liabilities are the assets accumulated in private pension plans in OECD countries, which amounted to US$ 16.8 trillion in 2009, or just over two-thirds of annual GDP (OECD, 2011).

It is no accident that, in both cases where the long-term health of the pension system is evaluated, that there is also a public pension reserve fund. With most countries around the world ageing, there are arguments to put money aside now. One approach is to assess the finances of the pension system over a long horizon and then set the parameters – contribution rates, benefit levels, pension ages etc. – such that the system is in equilibrium. With ageing, this should mean that the system runs surpluses now that will be drawn down in the future to pay for an older population's benefits. The scale of these surpluses will, of course, vary with the economic cycle.

6. Political economy of automatic adjustment mechanisms

It is clear from the previous sections that most of the reforms addressing sustainability of the pension system aim to contain expenditures or expanding the contribution basis by reducing the benefit levels, increasing the contribution rates or finally increasing the retirement age.

However, all of these reforms are politically contentious as they are perceived to reduce earned entitlements and are thus very likely to encounter strong opposition from some interest groups. For example, the reduction of pension benefits may be opposed both by current retirees and workers close to retirement. Similarly, an increase in the contribution rates or in the pension age may cause opposition of both young and old people, as witnessed recently in a number of European countries undertaking pension reforms.

Therefore, policy makers have often tried to render some changes "invisible" (for example changing the way benefits are computed) by making them very difficult to understand or they have delayed their introduction to a moment where governments will have ended their mandate. A more extreme solution that some countries have chosen was to exclude the majority of current workers from the reforms and focus implementation only on young and future workers.

It is also clear that solutions in this domain are not easy because as population ages, the electorate ages too. The resistance to such reforms is therefore deemed to increase in the future. In this context, automatic adjustments represent an attractive alternative. They are in fact designed to protect the pension system's long-term health from short-term political pressures. Thus the political risk of a pension reform is largely reduced. For example in case of life-expectancy indexation of pension benefits, an increase of life-expectancy will automatically drive a reduction of benefits because of its inclusion in the formula.

One crucial aspect for the "political" acceptance of this kind of mechanism is, however, the way it is designed. First, the mechanism may be activated on the realization of an outcome that is either projection-based or trend-based. Projections are extrapolated on the basis of specific

assumptions that hold over relatively long periods of time. The effect of forecasting errors and uncertainty may compound over time and may induce substantial differences in the variables that one tries to control. By contrast, mechanisms based on trend-realisation rest on the observation of actual data. However, this solution is not without problems because such mechanisms may display a high degree of volatility and may confound short-term and long-term effects.

Second, the strength of the mechanism may differ according to the fact that the automatic adjustment mechanisms are implemented in the perspective of preventing a situation of crisis, or in contrast, in the perspective of solving a crisis. In the former case, clearly the mechanism is set up to work for the longer term and may give better results than those set up to in emergency situations

Third, the frequency of the review matters. Infrequent reviews would probably drive larger changes in the parameters triggered by the mechanism than those requested by shorter-term review. For example, in Italy the review of the transformation coefficients to account for longer life expectancy was originally fixed to ten years (but never implemented in practice). The outcome of this review would have likely encountered stronger opposition than if it had happened on an annual basis – the modifications induced would have certainly been larger. The recent reform in Italy shortened in fact the frequency of the review to three years from 2010 until 2019 and to two years afterwards.

Another component of the design of automatic adjustment mechanisms is the speed of the adjustment. The faster the speed of the adjustment (for example, a rise in retirement age that occurs in 5 instead of 20 years) the higher the probability of strong opposition. Political pressures may still arise in presence of automatic adjustment mechanisms when the affected groups realise what this means for their benefit or retirement age. In some countries legislators have intervened and overridden the adjustment mechanisms.

A fifth essential characteristic of the design is the degree of automaticity. The degree to which adjustments to pension systems are, in practice, automatic, varies significantly. There have been examples of delays in implementation and, in other cases the heat of the political debate has not been reduced by agreement on the technicalities of these adjustments. Moreover, the financial and economic crisis had a profound impact on pension systems, leading to the suspension or revision of supposedly automatic adjustment mechanisms – as for example in Germany and Sweden in the aftermath of the crisis to maintain the pensioners' living standards (see e.g. Scherman, 2009). As a result, it is too soon to say whether these measures have been effective in achieving their targets.

A sixth important feature is about the distribution of losses, i.e. who will support the adjustments deriving from the triggering of the mechanism. In terms of political risk, the consequences will be different depending on whether they affect current or future retirees more.

Finally, an important feature of the design of automatic adjustment mechanisms is the provision of some form of protection for the most vulnerable. Safety-nets have provided great support to those on low-income in many OECD countries in the aftermath of the crisis.

Very few countries appear to have managed to combine in practice these parameters to make automatic adjustment a good tool of political economy of pension reform. Examples often mentioned in this context are the Canada pension plan and, in some cases, the NDC systems (see Weaver, 2011).

But even in those cases the final sustainability of the system rests on long-term projections and on the parameters' design. For example, the budgetary balance of NDC pension system depends on the indexing rule, which sets the internal rate of return and the evolution of pension benefits. That rule is once again based on the evolution of an economic parameter (see e.g. Legros, 2005). If the evolution expected does not take place, the stabiliser can be inefficient or even incapable of playing its role even when it has been correctly designed (see e.g. Scherman, 2011).

Finally, automatic adjustment mechanisms may be very difficult to implement for various reasons. Pressure from interest groups and norms about benefit entitlement may interfere with the design of the mechanisms and their functioning. In other cases, lack of time, funding or expertise may lead to delay the introduction of the mechanism. Politicians may also decide to suspend or to change the way such mechanisms will be implemented once they have been announced.

7. Summing-up

Population ageing – mainly driven by increasing life expectancy, declining fertility rates and larger cohorts approaching retirement – exerts an increasing fiscal pressure on the public budgets of most OECD countries. A major political challenge is therefore how to balance the financial sustainability of pension systems and the adequacy of retirement incomes.

The sustainability argument has led in many OECD countries to the introduction of a variety of mechanisms that try to automatically stabilise expenditures of public pension systems. Their action focuses typically on the adjustment of pension benefits, pension age and contribution rates.

The choice between the instruments analysed in this report has significant implications, involving trade-offs with other objectives of the pension system.

The ways these mechanisms are designed and implemented differ. As discussed in the previous section, although attractive for their capacity of reducing some costs associate to the reformed, in practice they are far from being perfect. Automatic adjustment mechanisms are often very complex and difficult to understand. Moreover, because they often make pension promises depending on some future economic or demographic developments, their implications (and potentially the individual losses they can cause) are not fully known today.

A clear information strategy about the probable future cuts in benefits related to increasing life expectancy or slower economic growth might however have important repercussions on the acceptance of the mechanisms. Workers, especially those near retirement, might strong oppose these changes because they would have neither the time nor the capacity of adapting to the new situation.

Automatic adjustment mechanisms – despite changing the parameters underlying the changes of either extending working lives or reducing public pension benefits –do not necessarily address the behavioural challenges faced by countries today: how to entice people to want to work longer or to save more? People faced with lower benefits may choose to work longer to increase their pension entitlements, but there is no mechanism ensuring that they will actually do so.

Any automatic stabilisation mechanism in place today, or implemented in response to this crisis, might in fact pose problems in terms of adequacy of future benefits and the capacity of systems to protect the living standards of beneficiaries. What will be the destiny of systems based on such rules? There is no doubt that as at present, there will be pressure to intervene to correct the systemic failures of such systems and even remove automatic stabilisers if they are perceived to be functioning badly.

It is important that the question of the adequacy of benefits, and thus of the social sustainability of pension systems, will not be left out of the debate. Maintaining financial and actuarial balance might be pursued together with a set of rules or principles to ensure that benefit levels would remain adequate.

The final outcome deriving from the implementation of automatic is therefore very complex.

Starting with the value of pensions, it is possible that the cuts needed to achieve financial equilibrium might eventually result in a benefit level too low for retirees to live on. This situation

may lead to substantial erosion of pension benefits as long as population ages. One shortcoming of the mechanisms is in fact, that they try to maintain the contribution rate constant by making all the adjustments rest on the benefit side. Most countries have safety-net benefits for low-income retirees: extra spending on these benefits might offset much of the savings made elsewhere.

There is scope for pension ages to rise in many OECD countries. However, at some point, again, increasing pension ages further must reach a limit where it is unreasonable to expect most people to be able to continue working - although views on where that limit lies may differ significantly (see on this Whitehouse and Zaidi, 2008 and D'Addio and Queisser, 2011). Moreover, increases in pension ages alone may be insufficient to ensure that people work longer if there are other barriers (on the demand side, for example) to older workers finding and retaining jobs (OECD, 2011).

Similarly, there is a limit to increases in contribution rates (this issue of "affordability" discussed above). Indeed, some countries have adopted automatic adjustment mechanisms specifically to exclude or restrict future increases in contribution rates.

It seems however plausible to assume that transparent changes and clear information will also help to improve confidence in the pension system in the future. For this to happen, changes should occur gradually, and the mechanisms should be designed in such a way that the possible burden is shared across generations so that individuals may act pro-actively by adapting their saving and labour supply behaviours.

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ANNEX 1: A DESCRIPTION OF SOME AUTOMATIC ADJUSTMENT MECHANISMS[17]

Canada

Concerning the links between pension benefits and life expectancy, in Canada there has been a marked shift from defined-benefit to defined-contribution provision in voluntary, private pensions in countries.

In Canada, there is a review of the financial sustainability of the earnings-related scheme every three years. The scheme is partially funded: the reserve is not designed to cover the entire liabilities but to smooth the required contribution rate over time and, in particular, to prepare for the impact of the large "baby boom" cohort reaching retirement age.

In Canada, the contribution rate may be increased conditional on: (i) the Canada Pension Plan showing in its actuarial report that the legislated rate is lower than the minimum contribution rate required for the sustainability of the plan; and (ii) that the federal and provincial ministers do not reach agreement on an alternative solution.

When an increase in contribution rates occurs, the indexation of pensions in payment is frozen for three years until the publication of the next actuarial report and the reassessment of the pension plan.

Denmark

In 2006 it was decided to increase the retirement age from age 65 to 67 between 2024 and 2027. Retirement age has been also indexed according to the average life expectancy of persons 60 years of 2025.

Finland

From 2010 new earnings-related pensions will be reduced according to increases in life expectancy. , The "life expectancy coefficient" automatically adjusts the amount of pensions in payment as life expectancy changes. The amount of new pension will depend (from 2010) on the development of life expectancy relative to the base level calculated in 2009. The change in life expectancy will be determined annually for the 62-year-old cohort using five year mortality data for people at least that old. Between 2002 and 2050, the Statistics Finland mortality projections imply an increase in life expectancy at age 65 from 18 years to 25.6. Using the assumptions from the pension model of the OECD, the adjustment expected in the year 2040, based on the mortality projections, is to reduce benefits to 80.7% of their value under the pre-reform rules. The life expectancy coefficient is calculated for each cohort at the age of 62.

France

Following the 2010 reform, a full rate first-stage public pension requires either both a minimum contributory record contribution period (the number of years of contribution required will rise from

[17] See also Scherman (2011).

the current 40 years to 41 in 2012 and 41.50 in 2020) and to have reached the minimum legal pension age (increasing from 60 to 62 years) or to have reached the age of the full rate pension (increasing from 65 to 67 years). The minimum contributory period is set by law to increase in line with increases in life expectancy, so that the ratio of period of pension payment to the working period remains constant (for example 163 quarters for the generation born in 1951, 164 quarters for the generation born in 1952 et and 165 quarters for the generation born in 1953 and 1954; and 166 quarters for the generations born in 1955 and after).

Germany

Germany introduced a "sustainability factor" into its public-pension scheme from 2005. The sustainability factor indicates the changes needed in the contribution rate and the pension level if the (system) dependency ratio increases. The size of the adjustment to the value of pension points depends on a measure of the system dependency ratio: that is, the ratio of the number of "standardised" beneficiaries relative to the number of contributors. The dependency ratio is "equivalised": it takes into account that high-earning contributors pay more into the scheme than low earners. The adjustment affects the change in the pension-point value. This means that pensions in payment will not be fully indexed to earnings growth, although a safeguard clause rules out reductions in nominal benefits. It equally affects all current workers and pensioners, since the accrued rights and future accruals will also be proportionately reduced or increased.

In Germany, the sustainability factor is not used only to index initial benefits but also to increase contribution rates. One parameter of the new formula allows the weight of the adjustment to be shared between pensioners and contributors. This parameter has been set equal to 0.25 by the German pension reform because this value would allow payroll taxes not to increase beyond 20% by 2020 and 22% by 2022. Hence, Germany is the only country where there is effectively an automatic link between contribution rates and the pension system's finances.

Greece

In Greece, the 2010 pension reform has introduced a mechanism that indexes both the statutory retirement age (65 years) and the minimum retirement age (60 years) to life expectancy from 2021 onward.

Italy

In addition to introducing notional accounts which replaced the traditional defined benefit schemes for young cohorts of workers, Italy has adopted several pension reforms to sustain its pension system. The most recent, very comprehensive, has been adopted in late 2011. Initially foreseen in 2009 (and made operational in 2010), the indexation to life expectancy will start in 2013 (instead of 2015). The second increase is planned in 2019 in order to align the revision of eligibility conditions with the revision of conversion coefficients in the NDC system. The age threshold for being entitled to the means-tested social allowance will be also indexed to life expectancy.

Japan

The 2004 reform in Japan introduced an adjustment to benefits related to life expectancy. Public-pension benefits have been cut by 0.9% a year for new retirees; this process will continue until 2023. These adjustments, designed to stabilise the finances of the pension system in the face of rapid population ageing. They are based on the assumption of constant increase in life expectancy of 0.3% per year. But there is no mechanism by which these adjustments vary should life expectancy increase at a different rate than that anticipated. There is no automatic link between pensions and life expectancy. The modified indexation is linked also to the reduction of the contributors to the social

security pension schemes. This implies that the there is a link to some demographic indicators though there is not a direct link to life expectancy. (See Scherman, 2011).

Norway

Currently the retirement age is fixed at 67 years in the public pension scheme. From 2011 it is decided to introduce flexible retirement for the age group 62-75 years based on actuarial neutrality. It will then be possible to combine work and pension fully or partly from the age of 62 without an earnings test. From 2011 it is also decided to introduce a life expectancy adjustment of the pension for new old-age pensioners. The life expectancy adjustment will be determined for each cohort, based mainly on remaining life expectancy. The factors will be determined when the cohorts are 61 years, and will not be adjusted later. Each cohort will receive a separate life expectancy factor from the age of 62 until the age of 75. At the time of retirement the annual pension is calculated by dividing the accumulated pension entitlements by a life expectancy divisor.

Portugal

In Portugal, the sustainability factor which determines the pension entitlement results from the relation between the average life expectancy at age 65 in 2006 and the one that will occur in the year before the pension claim. This factor applies to old-age pensions beginning from 1 January 2008 and to old-age pensions resulting from the conversion of invalidity pensions (it is applied at the date of conversion, when the pensioners is

The pension reform of 2007 introduced also a new indexation rule. For the purpose of calculating the pension according to the whole contributory career, the earnings amounts registered between 1 January 2002 and 31 December 2011 are valorised by an index weighted by prices (75%) and average earnings (25%) whenever the latter outstrips prices. The annual adjustment index cannot be higher than the CPI plus 0.5%. The indexes for the calculation basis adjustment will be reassessed after 31 December 2011

Spain

The 2010 reform included some adjustment to the pension system parameter to take place after 2027 under the automatic-review mechanism that will take place every five years, relevant to sustainability and adequacy of future benefits . These adjustments will be in line with the change in life expectancy at age 67. Life expectancy at age 67 is expected to grow by about 2.3 years for both men and women between 2027 and 2055, approximately when a recent labour-market entrant will be eligible to retire. However, the Government of Spain has not set out in detail which parameters would be adjusted (pension age, contribution years, accrual rate etc.).

Sweden

Sweden has introduced notional accounts (NDC) and substituted mandatory defined-contribution schemes for part of public pension provision In addition, there is a “balance mechanism”: if assets (the buffer fund plus the estimated value of assets in the form of contribution revenues) fall below liabilities (accrued notional pension capital and capital value of outgoing pensions), then indexation of pensions in payment and returns credited to notional accounts are reduced by the ratio of assets to liabilities. The balance ratio for year *t* is used to calculate the balance number or the need for activating the balancing mechanism in year *t+2*. An activated balancing mechanism would mean lower replacement rates from the national system but will produce higher results when the pension system recovers and the balance figure increases (the balance index can exceed the income index during the recovery period). The balancing ratio for 2008 and the balance number for 2010 are 0.9826.

Other mechanisms/Other countries

Poland, Mexico, the Slovak Republic and Sweden introduced defined contribution plans as a substitute for all or part of public pension provision. Australia and Norway added mandatory contributions to private pensions on top of existing public provision. Denmark has long had defined-contribution plans covering nearly all workers.