III. Taking stock of implicit pension liabilities

By Ben Deboeck and Per Eckefeldt

The vast majority of public pension schemes in the euro area have a pay-as-you-go set-up and are therefore unfunded by design, with current contributions being used to pay current benefits. Implicit pension liabilities (IPL) measure governments' long-term commitments. While IPL and conventional, explicit government debt differ significantly, in some situations the implicit liabilities can convert into explicit debt. This is the case when structural shortfalls arise within the pension system, which require financing. Accrued-to-date gross IPL estimates will yield large, positive values for all countries with pay-as-you-go systems – even those with perfectly balanced schemes. Accrued-to-date IPL are therefore not a measure of fiscal sustainability. In contrast, net IPL estimates that include both future rights and contributions to the scheme are better suited for sustainability analysis. We calculate both gross and net IPL estimates under such open system approach based on the long-term projections of the Ageing Report. The net variant provides insights into the extent to which pension systems can be considered underfunded given current policies. The analysis of IPL can help identify the future cost of current pension policies as well as the impact of pension reforms. They can also complement conventional debt and deficit measures, provided such analysis is part of a comprehensive fiscal sustainability assessment.

III.1. Introduction

The vast majority of public pension schemes in the euro area have a pay-as-you-go set-up and are therefore unfunded by design, with current contributions being used to pay current benefits. Working households accrue pension rights, but also pay contributions, allowing authorities to redeem their liabilities to retirees. As a result - and in contrast with a typical private pension scheme - no assets are accumulated within public pension schemes.

Contrary to government debt, there are generally no explicit legal or contractual obligations linked to public pension schemes. There are nevertheless strong societal expectations that accrued rights will be redeemed, based on the 'social contract' underlying public pensions([124]). Therefore, unfunded pension liabilities are referred to as 'implicit pension liabilities' (IPL). Other differences with conventional debt are discussed in Section III.2.

As highlighted by Franco (1995), there is nothing inherently negative in the existence of unfunded pension liabilities([125]). The matter should rather be judged in terms of the efficiency of pay-as-you-go schemes and their role in achieving society's equity objectives. However, the transient effect of retiring baby boomers between around 2010 and 2030 results in a strong influx into retirement that is not compensated by concurrent labour market inflows. This comes on top of the structural effect of rising longevity. Outlays will therefore overtake contributions in many Member States, putting public finances under pressure as governments have to make up for the shortfall, either through offsetting measures or by incurring higher debt. In the latter case, the rise in explicit government debt mirrors a gradual decrease in the IPL linked to past pension promises to generations that enter retirement.

IPL are calculated as the present value of pensions to be paid in future. They therefore represent the actuarial stock equivalent of the flow of pension benefits that will ensue in future. This underscores the importance of the discount rate assumption. Different concepts of IPL exist, depending on which rights are considered. The most restrictive concept measures all rights accrued up to a given point (accrued-to-date liabilities). In the broadest approach (open system liabilities), both current and future rights are included. Section III.2 discusses the different concepts and how they should be interpreted, as well as the methodological limitations of the IPL concept.

Until recently, there was no structured reporting of unfunded (or underfunded) pension liabilities in standard national accounts. Indeed, under the European System of Accounts of 1995 (ESA 95) only the obligations of funded pension schemes were considered to create liabilities for the employer and social security. This changed with the latest system (ESA 2010) which introduced an enhanced statistical reporting on pensions. Data

([124]) Brixi, H.P. and A. Schick (ed.) (2002), 'Government at risk: contingent liabilities and fiscal risk', World Bank.

([125]) Franco, D. (1995), 'Pension Liabilities – Their Use and Misuse in the Assessment of Fiscal Policies', DG ECFIN, Economic Papers No 110.

reporting by the Member States now covers all accrued-to-date employment-related pension liabilities, irrespective of whether they are funded or not, thus providing comparable data on unfunded general government pension schemes. Section III.3 discusses the results of the first data transmission, while Section III.4 presents IPL estimates for the open system based on the long-term pension projections in the 2018 Ageing Report.

III.2. IPL: concepts, relation to government debt and use for fiscal sustainability analysis

The concept of implicit pension liabilities (IPL) is not new, though it sometimes goes by different names, being also referred to as 'implicit pension debt' or 'social debt'. In this paper, we will consequently refer to implicit pension *liabilities* to avoid confusion with explicit public *debt* (see below). Also 'pension wealth' and 'social security wealth'([126]) have been used when approaching the matter from a microeconomic point of view, namely the impact of anticipated future entitlements on individuals' decisions on retirement and personal savings. In this sense it should be pointed out that 'rights' and 'obligations' as well as 'entitlements' and 'liabilities' can be used interchangeably as they reflect two sides of the same coin: the point of view of the household sector versus that of the government sector.

Estimates for individual countries were presented in Feldstein (1974) and Bohn (1992) for the US, in Hills (1984) for the UK and in Castellino (1985), Pench (1993) and Beltrametti (1993, 1994) for Italy([127]). IPL estimates for broader sets of countries were first done in Hagemann and Nicoletti (1989), van den Noord and Herd (1993) and Kuné et al. (1993)([128]). Later estimates include Chand and Jaeger (1996), Kane and Palacios (1996), Frederiksen (2001) and Holzmann et al. (2004)([129]).

As discussed in Franco et al. (2006), the estimates in these studies vary considerably as a result of different methodological approaches, databases and reference years([130]). As a result, comparisons are not obvious. Estimates also vary because, for practical reasons, little attention was paid to complex country-specific pension designs such as statutory and early retirement ages, accrual rates or special arrangements for civil servants.

III.2.1. The different approaches for measuring implicit pension liabilities

The literature commonly distinguishes between three IPL concepts (Castellino, 1985; Franco, 1995): (i) accrued-to-date liabilities, (ii) closed system liabilities and (iii) open system liabilities. All three approaches include the liabilities that correspond to hitherto accrued pension rights, be it by pensioners or by current workers. The distinction between the concepts stems from the degree to which calculations include rights that will accrue in the future.

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([126]) 'Social security wealth' (Feldstein, 1974) refers to the United States, as the federal public pension scheme is known as *Social Security*, a term that has a broader meaning in Europe.

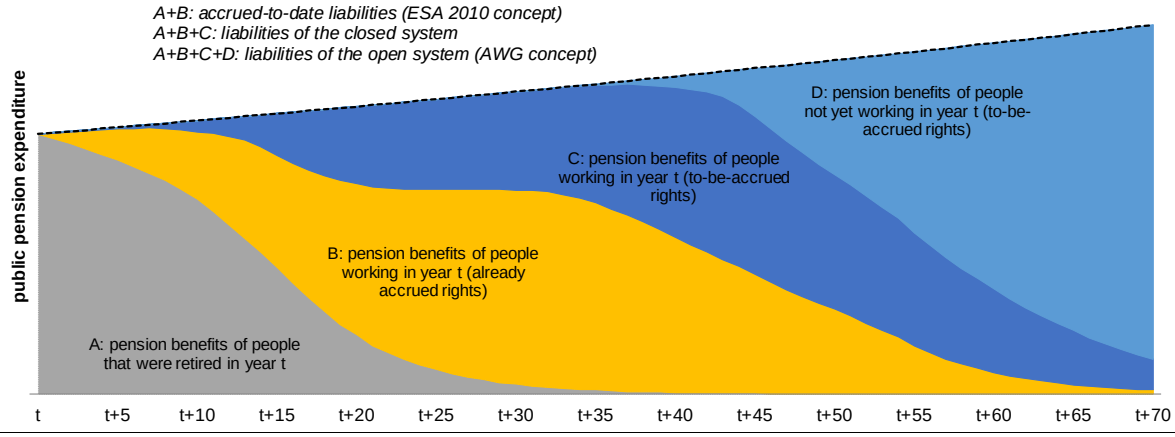
([127]) Feldstein, M. (1974), 'Social Security, Induced Retirement, and Aggregate Capital Accumulation', *Journal of Political Economy*, September-October. Bohn, H. (1992), 'Budget deficits and government accounting', *Carnegie-Rochester Conference Series on Public Policy*, Vol. 37, pp. 1-84. Hills, J. (1984), 'What is the Public Sector Worth?', *Fiscal Studies*, Vol. 5, No. 1, pp. 18-31. Castellino, O. (1985), 'C'e un secondo debito pubblico (piu grande del primo)?', Moneta e credito, No. 149. Pench, L. (1993), 'Debt, deficits and fiscal adjustment' in 'The economic and financial situation of Italy', European Commission DG ECFIN, European Economy, Reports and Studies, No. 1. Beltrametti, L. (1993), 'Una stima della ricchezza pensionistica per l'Italia (1951-1991)', *Rivista internazionale di scienze sociali*, No. 1, pp. 3-15. Beltrametti, L. (1994), 'Su alcuni effetti redistributivi della riforma del sistema previdenziale', in Rossi, N. (ed.), 'Una transizione equa, 1992-1993.' Secondo rapporto CNEL sulla distribuzione e redistribuzione del reddito in Italia, Il Mulino.

([128]) Hagemann, R. P. and G. Nicoletti (1989), 'Ageing populations: economic effects and implications for public finance', OECD Department of Economics and Statistics, Working Paper No. 61. van den Noord, P. and R. Herd (1993), 'Pension liabilities in the seven major economies', OECD Economics Department Working Papers, No. 142. Kuné, J., Petit, W. and A. Pinxt (1993), The hidden liabilities of basic pension systems in the European Community, CEPS Working Document, No. 80.

([129]) Chand, S. and A. Jaeger (1996), 'Aging populations and public pension schemes', International Monetary Fund, Occasional Paper, No. 147. Kane, C. and R. Palacios (1996), 'The implicit pension debt', IMF, Finance & Development, June 1996. Frederiksen, N. K. (2001), 'Fiscal sustainability in the OECD. A simple method and some preliminary results', Finansministeriet, Working Paper 3/2001. Holzmann, R., Palacios, R. and A. Zviniene (2004), 'Implicit Pension Debt: Issues, Measurement and Scope in International Perspective', World Bank, Social Protection Discussion Paper Series, No. 403.

([130]) Franco, D., Marino, M. R. and S. Zotteri (2006), 'Pension Expenditure Projections, Pension Liabilities and European Union Fiscal Rules', *SSRN Electronic Journal*.

Graph III.1: **IPL concepts**



Abstraction is made of the possibility of partial retirement.
Source: Based on Eurostat (2012), 'Technical Compilation Guide for Pension Data in National Accounts (2011 edition)'.

point, be it by pensioners or by current workers. The distinction between the concepts stems from the degree to which calculations include rights that will accrue in the future.

Graph III.1 visualises the different (gross) concepts and how they relate to each other. In this graph, which assumes that total public pension expenditure will rise over time, pension benefits are divided over different population groups in function of their current status. The IPL estimate results from discounting the considered payment flows to the base year.

The graph demonstrates that the magnitude of IPL depends on the age distribution of the population: an older population implies there is a higher share of pensioners and workers close to retirement, and therefore a higher present value of accrued rights. Other determinants are the maturity of the system, the average benefit level, benefit indexation and the applied discount rate.

Accrued-to-date liabilities

'Accrued-to-date liabilities' (ADL) represent the present value of future pension benefits that result from rights accrued until the base year. The payment streams associated with those rights can be split into pensions of current retirees and those that will have to be paid to current workers on the basis of already accumulated rights. Rights accrued after the base year are therefore not considered. The ADL concept corresponds to the discounted value of areas A and B in Graph III.1. This is the approach under ESA 2010, as national accounts apply an accounting perspective: pension entitlements accrued by the end of a reporting period (see Section III.3).

ADL can be interpreted as a 'termination liability' (Holzmann et al., 2004) in the sense that it provides a measurement of the budgetary cost of a termination of the public scheme, assuming authorities do not renege on accrued entitlements. ADL then represent the compensation pensioners and workers are entitled to. This would be the case when switching from a pay-as-you-go defined benefit scheme to a funded defined contribution scheme with workers' contributions fully paid into the new system from that point forward. Authorities would then have to finance the shortfall in the old scheme until the last retiree dies. In the absence of expenditure cuts or new revenues, the implicit liabilities of the old scheme are therefore gradually converted into explicit government debt. Alternatively, the scheme could be closed with immediate effective with all entitlements bought off upfront. In that case, there would be a one-off hike in government debt corresponding to the present value of all future entitlements, i.e. the ADL estimate.

In practice, however, the implicit liabilities incurred by mature public schemes will be so large that the instant shift to a fully funded system is not conceivable given the fiscal impact of such an operation. As a result, privatisations of public pension systems have occurred more gradually with part of workers' pension contributions diverted to the new second tier plans.

This is what several Member States did in recent decades: partly replacing the pay-as-you-go

schemes by usually mandatory, fully funded schemes([131]). In such cases, there is a transitional cost (equal to the decline in ADL, which is being 'paid off') until all retirees draw a pension from both pillars and balance in the public pillar is restored. Crucially, in most Member States, the size and the financing of the transitional costs of diverting part of the contributions to funded individual accounts did not play a major role in the public debate preceding the push for privatisation. As a result, the fiscal burdens associated with the reforms were generally ignored (OECD, 2003)([132]).

For Hungary, a non-euro area country, Rocha and Vittas (2001) estimated the expected annual shortfall at an initial 0.8% of GDP, growing to 1.4% after 30 years. Conversely, the authors reckoned that after a decrease in the accrued-to-date IPL of the Hungarian state of 9 percentage points (pps) of GDP in 1997, it would rise to 40 pps of GDP in 2030([133]). At the end of 2010, following annual transfers of between 1% and 1.4% of GDP to the social security system in 2005-2010 (Bielawska et al., 2017), Hungary decided to close the private pillar to new entrants and to appropriate the savings on most individual balances, virtually ending the private pillar (Mesa-Lago, 2014)([134]). As a result, transitional costs in the form of transfers to the social security system fell to zero as of 2011 (Bielawska et al., 2017). Around 90% of the assets under management – representing about 11% of Hungarian GDP – were transferred to the central budget and used to reduce government debt. Freudenberg et al. (2016) estimated the ADL of the Hungarian state at 252% of GDP in 2010 before the return to the mono pillar system([135]). The switchback led to an increase in ADL by 13 pps of GDP.

The experience of the Central and Eastern European Member States shows that these transitional costs can be sizeable. It also shows that even though pension liabilities might be only implicit, they are very real - see Carone et al. (2016) for an overview of pension reforms in EU Member States([136]). To cater for the budgetary impact of introducing 'a multi-pillar system that includes a mandatory, fully funded pillar', the 2005 revision of the Stability and Growth Pact included the stipulation that due consideration must be given to transition costs linked to pension reforms when assessing compliance with the deficit and debt criterion in the corrective arm of the pact. Under the preventive arm, Member States are allowed to temporarily deviate from their medium-term budgetary objective (MTO) or the adjustment towards it to take such adjustment costs into account([137]).

The ADL approach to IPL is a gross concept given that, under the pay-as-you-go set-up, there usually are no assets as current scheme members' past contributions were effectively used to pay for past pension benefits. Accrued-to-date assets are therefore zero. The exception in the euro area is Finland, whose defined benefit system is partly pre-financed. The pre-funded scheme covers about a quarter of earnings-related pension outlays in the private sector, the remainder being classic pay-as-you-go systems. Pension assets represented between 84% and 91% of GDP in 2014-2019 (see Section III.3). In Sweden, the fully funded defined contribution pension component is statistically classified as households' savings and therefore falls outside the government sector([138]).

([131]) This was the case in Hungary and Sweden (1998), Poland (1999), Latvia (2001), Bulgaria, Croatia and Estonia (2002), Lithuania (2004), Slovakia (2005), Romania (2008) and the Czech Republic (2013) with Slovenia being the only exception among the 11 Central and Eastern European countries that joined the EU since 2004.

([132]) OECD (2003), 'Reforming Public Pensions – sharing the experiences of transition and OECD countries'.

([133]) Rocha, R. and D. Vittas (2001), 'Pension reform in Hungary: A preliminary assessment', World Bank, Policy Research Working Paper, No. 2631. The impact of other reform measures than the creation of the mandatory second pillar (e.g. increase in retirement ages and less favourable indexation rules) is not included in these numbers. The authors estimated the impact of those reforms on ADL at -68 pps. of GDP in 1997 and -124 pps. of GDP in 2030.

([134]) Bielawska, K., Chloń-Domińczak, A. and D. Stańko (2017), 'Retreat from mandatory pension funds in countries of the Eastern and Central Europe in result of financial and fiscal crisis: causes, effects and recommendations for fiscal rules', MPRA. Mesa-Lago, C. (2014), 'Reversing pension privatization: the experience of Argentina, Bolivia, Chile and Hungary', ESS Working Paper No. 44, International Labour Organization.

([135]) Freudenberg, C., Berki, T. and A. Reiff (2016), 'A Long-Term Evaluation of Recent Hungarian Pension Reforms', MNB Working Paper 2016/2.

([136]) Carone, G., Eckefeldt, P., Giamboni, L., Laine, V. and S. Pamies Sumner (2016), 'Pension Reforms in the EU since the early 2000's: Achievements and Challenges Ahead', European Economy, Discussion Paper 42.

([137]) See European Commission (2019), Vade Mecum on the Stability & Growth Pact (2019 edition), DG ECFIN, European Economy Institutional Paper No. 101. Thus far, Latvia and Lithuania have made use of the 'pension reform clause' in the Stability and Growth Pact.

([138]) See country fiches of the 2018 Ageing Report, https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en.

A particular, simplified method that allows ADL to be calculated for large subsets of countries with limited data availability is the 'Freiburg model'. This model is based on a reduced version of the generational accounting methodology (Auerbach et al., 1994)([139]). The model is restricted to public pension schemes and looks only at the generations included in the group of current pensioners and current contributors (Heidler et al., 2009)([140]). Approaching IPL through the spectre of generational accounting provides a picture of the pension system's intergeneration equity.

The closed system

The '**closed group**' or '**closed system**' concept([141]) defines IPL as the sum of all liabilities accrued up to that point and those that will be accrued in the future by *current workers*. Under this approach, the pension system is closed to new entrants and assumed to remain operational until the last current contributor dies. This constitutes a phasing-out of the current scheme over several decades.

The closed system is a broader concept than ADL and therefore results in a higher IPL estimate, given that current workers' future pension rights are also included. The closed group approach corresponds to the benefits in areas A, B and C in Graph III.1. Beltrametti (1994) used the closed system to assess the impact of the 1992 Amato reform on Italy's IPL. He estimated that in 1992, IPL decreased from 389% of GDP before the reform to 278% afterwards.

Considering that the closed group approach includes rights to be accrued in future, a net estimate can also be made. In this case, both future rights and contributions of current scheme members are considered, resulting in the net present value of future cash flows. This would correspond to what Feldstein (1974) called 'net social security wealth'. Net implicit liabilities under the closed system concept could, for example, provide insights should the existing defined benefit pension scheme be maintained for current workers, with new workers being obliged to switch to a notional defined contribution scheme designed to ensure actuarial neutrality. Net liability estimates would then give an idea of the size of the gap in the current system that would need to be covered by transfers from the general government budget.

The open system

The third and most comprehensive IPL concept is the '**open system**' approach. It extends the current pension scheme to new entrants, including workers still to be born. In Graph III.1, liabilities under the open system concept equal the discounted value of areas A, B, C and D, i.e. all future benefits. While applying an infinite time horizon will provide the most complete estimate, the time period may need to be limited to several decades, due to the absence of very long-term projections and the uncertainty that surrounds such exercises. Moreover, the present value of rights claimable within 50 years or more should be limited.

Open system liabilities can also be estimated in net terms, thus deducting the present value of all future contributions. A positive net IPL would therefore signal future deficits in the public pension scheme and reveal a need for policy change, unless the public pension fund is big enough to cover the shortfalls (EP, 2011)([142]). Section III.4 discusses estimates for the open system, both gross and net, based on the projections prepared by the Ageing Working Group for the triennial Ageing Report.

The above shows that there is no single best definition of implicit liabilities. The most suitable approach will depend on what one wants to analyse. In the case of moving from an unfunded to a funded pension system, the ADL (if only current rights are affected) or the closed system definition are the most relevant, as discussed above. The open system would the most appropriate to assess the financial sustainability of a pension scheme (see below).

III.2.2. Usefulness and drawbacks of IPL

IPL estimates have the advantage of capturing future flows into one stock indicator, which might

([139]) Auerbach, A., Gokhale, J. and L. Kotlikoff (1994), 'Generational accounts: a meaningful way to evaluate fiscal policy', *The Journal of Economic Perspectives*, 8 (1), pp. 73-94.

([140]) Heidler, M., Müller, C. and O. Weddige (2009): 'Measuring accrued-to-date liabilities of public pension systems: Method, data and limitations', Discussion Paper No 37, Forschungszentrum Generationen-verträge (FZG), University of Freiburg.

([141]) This IPL concept also goes by the name of 'current workers' and pensioners' liabilities'.

([142]) European Parliament (2011), 'Pension systems in the EU – contingent liabilities and assets in the public and private sector', IP/A/ECON/ST/2010-26.

be more telling and allows for cross-country comparison as well as for comparing the situation in a country at different points in time. They summarise for example, in case of the open or closed system, the expected impact of phased-in pension reforms.

However, IPL estimates have a number of methodological drawbacks as discussed in Franco (1995). This is unsurprising considering that they require long-term simulations of pension systems, demographic changes and economic developments. For example, detailed, longitudinal information is required on the distribution of workers and pensioners according to age, sex, wage and contribution periods. Ideally, estimates fully consider the prevailing rules in every country and, if necessary, the rules that apply to each of the existing schemes. Consistent long-term projections on life expectancy, wage growth and inflation are also needed. Furthermore, assumptions on the applied discount rate can significantly affect the results. For example, with a discount rate of 3%, amounts due in 25 years are about halved in present value terms; whereas they are only around 30% when the discount rate is 5%.

For net IPL estimates, the contributory side also complicates calculations given the variety of ways in which pensions are financed across countries. In most of them financing comes from dedicated social security contributions. For others, financing comes partly from other sources, such as general tax revenues, while some countries levy a general social security contribution instead of a specific pension contribution (e.g. Belgium). Sometimes, contributions adjust automatically to ensure the financial sustainability of the public pension system (e.g. Germany). Another element to consider is whether pension benefits are subject to personal income taxes, and therefore flow back to the state coffers.

III.2.3. Implicit pension liabilities versus explicit public debt

As discussed above, implicit pension liabilities (IPL) can become explicit public debt when shortfalls arise in the pension system, which require financing, possibly leading to debt issuance. However, this does not mean that IPL should be simply equated to public debt, let alone that IPL should be added to the debt stock to obtain 'actual' debt. According to Franco (1995), accrued-to-date liabilities are the only pension liabilities that could, in theory, be assimilated to conventional, explicit public debt. Indeed, the other IPL concepts discussed above also include potential liabilities based on pension rights that are still to accrue. In contrast, conventional public debt is backward-looking, similar to accrued-to-date liabilities (ADL). Moreover, ADL do not take account of the net present value of the future social security contributions that will be used (at least partly) to finance the pension outlays, making it a 'gross' concept. Accrued-to-date IPL are therefore not a measure of fiscal sustainability, as discussed below.

However, there are several ways in which even accrued pension rights differ in practice from conventional, explicit public debt. As mentioned above, the origin differs. Explicit claims such as government bonds are backed by a legal contract that fixes the repayment schedule. Implicit liabilities are moral obligations, rooted in a social contract, and their redemption schedule depends on many factors.

Because pension rights are not embodied in formal contracts, pension right holders are less protected than bondholders. Whereas defaulting on government debt results in market disruptions, in the case of pension liabilities the debtor can modify rights without giving rise to legal claims, as the sweeping reforms in several Member States over the past decade illustrate. However, there have been reversals of pension reforms as a result of court rulings([143]). The 1992 Italian pension reform cancelled about 30% of the IPL (Beltrametti, 1994)([144]). The annuity factors that characterise the notional defined contribution systems found in several Member States are examples of how, upon retirement, pension rights are unilaterally adjusted in function of a fictitious rate of return and estimated remaining life expectancy.

Another important difference concerns the way rights are created. While government bonds can be bought freely on the market, the acquisition of pension rights is generally compulsory and rights are not tradable. This means that there is no market price for pension liabilities and that one can only estimate the value of pension liabilities (Beltrametti, 1995)([145]). It also implies that large

([143]) This was the case for example in Portugal and in Greece.
([144]) Sections III.3 provides a more recent example of reforms showing in IPL estimates.
([145]) Beltrametti, L. (1995), 'On pension liabilities in Italy', *Ricerche Economiche*, Vol. 4, No 4, pp. 405-428.

IPL do not lead to direct financial market pressure (Franco, 1995) and that they are automatically rolled-over to the extent that new contributions allow for the redemption of old liabilities but at the same time create new liabilities.

III.2.4. Implicit pension liabilities and sustainability

The non-inclusion of implicit pension liabilities in conventional debt indicators is justified considering the above listed dissimilarities from explicit public debt. For the same reason, IPL in themselves do not represent a full-fledged measurement of fiscal sustainability, they simply reflect different sizes of public PAYG schemes (Beltrametti and Della Valle, 2011)([146]).

Still, IPL can enrich the sustainability assessment of pay-as-you-go public pension schemes and of public finances in general, provided the appropriate concept is used. Indeed, gross estimates such as accrued-to-date liabilities do not provide a correct picture of the future balance of the public pension scheme, as future contributions that will help finance these liabilities are not considered. As underlined by Franco (1995), for a given ratio of accrued-to-date liabilities to GDP, a country can be either on a sustainable or on an unsustainable path. All one can say is that the larger the ratio, the higher the share of future public resources committed to pension expenditure.

Open system net liabilities can be considered an appropriate tool to identify intertemporal fiscal gaps (Holzmann et al., 2004). In contrast to the backward-looking ADL, they apply a wide time horizon to assess whether under current legislation the pension system is in actuarial balance. There may, however, be simpler and more transparent indicators than IPL to assess the medium-term perspective of pension systems, such as the expenditure-to-GDP ratio and the contribution rate (Franco, 1995).

Moreover, if net IPL point to imbalances in the pension system, this does not imply the erosion of overall fiscal sustainability. The latter needs to be assessed at the level of the general government, considering all budgetary items. This is the case for the European Commission's comprehensive medium and long-term fiscal sustainability analysis and the S1 and S2 indicators([147]). Aside from the initial budgetary position and the explicit debt stock, both indicators account for the projected increase in ageing costs: pensions but also health care, long-term care, education and unemployment benefits. As with pensions, a future increase in (net) expenditure on these items can be considered as being due to the current stock of implicit liabilities becoming visible.

IPL are also incorporated into the EU fiscal framework in other ways. Since the 2005 reform of the Stability and Growth Pact, projected ageing costs help determine the medium-term budgetary objectives (MTOs)([148]). These MTOs are the anchor point of fiscal surveillance and provide the structural balance targets towards which countries need to adjust. As a result, the EU fiscal framework partly accounts for implicit liabilities([149]).

There are other examples of sustainability frameworks that consider IPL. 'Balance sheet analysis', an approach that has regained prominence in recent years, goes beyond the traditional analysis of debt stocks and government deficits. By compiling a complete balance sheet, including IPL, with an estimate of 'intertemporal net worth' as the balancing item, it provides a more nuanced and fuller picture of public finances([150]). This method is also applied in Velculescu (2010)([151]). She also uses the Commission's S1 and S2 indicators to provide alternative intertemporal net worth estimates with finite and infinite horizons, respectively. These reflect the total net liabilities of the public sector (current and projected) under unchanged policies. The

([146]) Beltrametti, L. and M. Della Valle (2011), 'Does pension debt mean anything after all?', MPRA Paper No. 29694.

([147]) The S1 indicator shows the additional fiscal effort (improvement in the structural primary balance) required in the five years following the Commission forecast to reach, within 15 year, the 60% of GDP debt ratio target. The S2 indicator shows the upfront fiscal adjustment (improvement in the structural primary balance) required to stabilise the debt ratio over the infinite horizon. For details, see Annex 5 in European Commission (2020), 'Debt Sustainability Monitor 2019', DG ECFIN, European Economy Institutional Paper No. 120.

([148]) The report of the 20 March 2005 Council states that "implicit liabilities (related to increasing expenditures in the light of ageing populations) should be taken into account" to determine MTOs.

([149]) See European Commission (2019), 'Vade Mecum on the Stability & Growth Pact (2019 edition)', DG ECFIN, European Economy Institutional Paper No. 101, pp. 11-12.

([150]) See, for example, European Commission (2019), Fiscal Sustainability Report 2018, DG ECFIN, European Economy Institutional Paper No. 094; IMF (2018), Fiscal Monitor: Managing Public Wealth, October 2018.

([151]) Velculescu, D. (2010), 'Some Uncomfortable Arithmetic Regarding Europe's Public Finances', IMF Working Paper, No. 177.

methodology used in Section III.4 to estimate gross and net IPL for the open system is similar to Velculescu (2010). Generational accounting also includes IPL. A recent example is Arevalo et al. (2019)([152]).

III.3. The supplementary table on accrued-to-date pension entitlements in social insurance ('Table 29')

National accounts data on pensions present an accounting perspective whereby all liabilities arise from observed, past events. They show gross social insurance pension entitlements accrued at the end of a reporting period by the current workforce and retired people. Therefore, national accounts use the ADL approach. In the past, the standard accounting systems did not include the implicit liabilities accrued up to that point by the general government's pay-as-you-go schemes (social security schemes and unfunded schemes for general government employees). Such data became available in the new ESA 2010 'Table 29', in columns G and H, not included in the core national accounts. This section discusses the first data transmission for 2015 for these two categories([153]).

The table provides the stock of pension entitlements at the beginning and at the end of a reporting period, as well as the flows causing the changes between both balances([154]). These flows broadly cover: (i) increases in pension entitlements due to social contributions; (ii) reductions because of benefit payments; (iii) transfers between schemes; (iv) changes due to reforms; (v) revaluations (changes in discount rate, wage rate and inflation rate assumptions); and (vi) changes in the demographic assumptions used in the actuarial calculations.

The supplementary table presents the perspective of the debtor (the pension manager), showing liabilities or implicit liabilities, as well as that of the creditor (households), showing either assets or implicit assets. In principle, only old-age pensions are reported – including those pensions paid before the statutory retirement age, excluding assistance schemes. Survivor and disability pensions are included insofar they are an integral part of the pension scheme.

One key assumption is the discount rate used to determine the present value of future benefit flows. This actuarial assumption represents the cost of capital in the sense that governments need to provide financing for future pension benefits.All euro area Member States applied a fixed 5% nominal discount rate, in keeping with the recommended approach by Eurostat to align the Table 29 calculations with the interest rate assumptions of the Ageing Report (Eurostat, 2012)([155]). To test for the responsiveness of the calculations to changes in the discount rate, two sensitivity scenarios are estimated, assuming discount rates to be 1 pp higher or lower (see infra).

Considering that public pension benefits are generally determined in function of the retiree's wage (either final, an average or lifetime earnings), another important assumption is whether future wage growth is accounted for. There are two general approaches: 'projected benefit obligation' (PBO) versus 'accrued benefit obligation' (ABO). PBO fully accounts for future increases in income when determining accrued pension rights. The ABO approach disregards future wage increases, resulting in lower estimates in most cases (Eurostat, 2012). For public pension schemes, PBO is considered more suitable then ABO given that schemes are likely to exist until the end of a worker's career and future wage growth is therefore relevant for the benefit calculation([156]). In contrast to ABO, the PBO approach will also reflect pension reforms that alter, for example, the

([152]) Arevalo, P., Berti, K., Caretta, A. and P. Eckefeldt (2019), 'The Intergenerational Dimension of Fiscal Sustainability', European Economy, Discussion Paper 112.

([153]) This first data, reflecting the situation at end-2015, was disseminated by Eurostat in December 2019. It covered all Member States except for Greece and Luxembourg. It also covered the UK, Iceland, Norway and Switzerland. Some countries published data covering a longer period (see https://ec.europa.eu/eurostat/web/pensions/information-member-states). Updated information is due by the end of 2020 (balance sheets for 2016, 2017 and 2018).

([154]) For a detailed overview of the supplementary table and its compiling methodology, see European system of accounts - ESA 2010, Chapter 17, paragraphs 17.121-17.183.

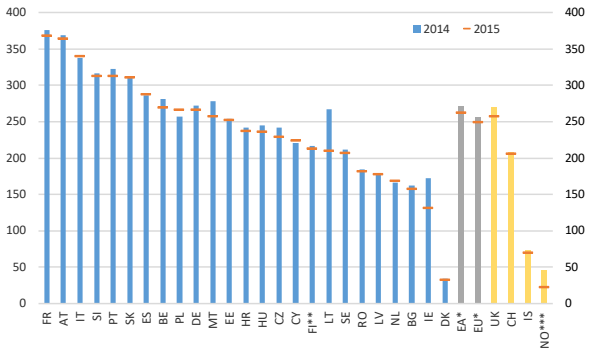
([155]) Non-euro area countries deviated from the 5% in some cases. For Denmark, reported social security pension schemes (column H) only cover the early retirement scheme. As one can only receive early retirement benefits for 5 years, no discounting was applied. For Sweden, the discount rate is based on 10-year government bonds.

([156]) The ABO method would be appropriate if one wants to estimate accrued-to-date liabilities as a termination liability (see Section III.2).

reference career in the pension formula (Eurostat, 2012).

Most countries apply the PBO method to estimate accrued-to-date liabilities, though some use ABO when this better reflects reality. Benefits are indexed in accordance with national rules and wage growth is generally based on the assumptions in the 2018 Ageing Report. In most cases, the demographic projections used for the Table 29 calculations are the same as those underpinning the latest Ageing Report, namely the ESSPOP2015 projections as prepared by Eurostat([157]).

Graph III.2: **Accrued-to-date pension liabilities (%GDP)**



2014/2015 are the opening/closing balances for 2015. *no data for EL/LU; EU excluding DK; unweighted average. **Net of assets as Finland's statutory earnings-related pension scheme is partially funded. Gross accrued-to-date liabilities amounted to about 300% of GDP in 2014 and 2015. ***Net of assets accumulated in the Government Pension Fund Global. Gross accrued-to-date liabilities amounted to 251% of GDP in 2014 and 263% in 2015.
Source: Calculations based on Eurostat, www.nbim.no and Finnish Centre for Pensions.

Given that public pension schemes in euro area Member States are nearly all unfunded, accrued-to-date IPL are considerable in terms of GDP, with a euro area average of 263% of GDP in 2015 and more than 200% of GDP for 19 of the 25 reporting EU Member States (see Graph III.2). As mentioned above, this measurement is gross of future social security contributions. Estimates for 2015 range from 369% of GDP in France to 32% in Denmark. The latter is a special case considering that Denmark's social security pension is mostly not covered by the supplementary table as it is considered to be 'social assistance'. As a result, figures for Denmark represent only the unfunded civil servant scheme and the limited amounts linked to the early retirement scheme.

Compared to 2014, ADL estimates are rather stable for most Member States, as one would expect. The euro area average decreased from 272% to 249% of GDP. The largest changes were for Lithuania (56 pps of GDP), Ireland (-41 pps) and Malta (-20 pps-). For Ireland, this reflects a denominator effect due to revised GDP growth brought about by the relocation of intellectual property by multinational companies, which resulted in a one-off jump in GDP. The smaller impact in Malta was due to high GDP growth that resulted in a steady decline in the ADL estimate according to the longer time series (for 2012-2016) published by the Maltese National Statistics Office.

In the more interesting case of Lithuania, the downward shift reflects a broad reform package([158]), which in itself reduced the present value of the accrued-to-date pension liabilities by 61 pps compared to 2014, while the country estimated ADL within the narrow range of 266-272% of GDP in 2012-2014. Also Belgium legislated a pension reform in 2015, increasing the statutory retirement age by 2 years by 2030. This reform reduced the IPL by an estimated 7 pps of GDP according to the reporting in the supplementary table. In the case of France, reform measures enacted in 2015 reduced the ADL figure by about 4 pps of GDP([159]). These examples show how ADL estimates can be a tool for assessing pension reforms. An example of a reform with an increase of accrued-to-date pension liabilities is Latvia in 2017: changes in pension indexation caused a 13 pps rise of GDP compared to end-2016, according to the longer time series prepared by the Central Statistical Bureau.

As the current value of future entitlements is measured, estimates are very sensitive to the interest rate assumptions used. This is illustrated in Graph III.3, which shows the sensitivity scenarios that accompany the baseline Table 29 calculations and assume discount rates to be 1 pp lower and higher, i.e. 4% and 6% in nominal terms (2% and

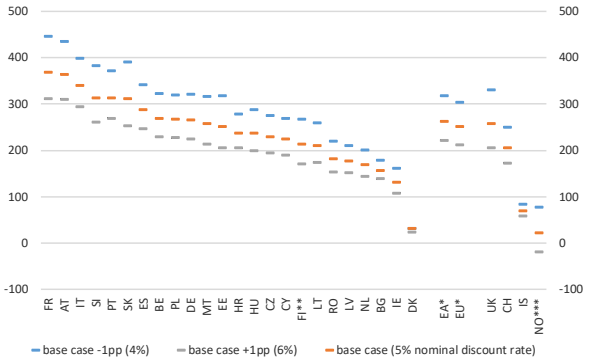
([157]) See https://ec.europa.eu/eurostat/cache/metadata/en/nasa_10_pens_esms.htm#annex1555069671419 for methodological notes per country.

([158]) Measures include the automatic indexing of pensions to the overall wage sum, the switch from a defined benefit system to a point system and an increase of the eligibility requirements for a full general pension component.

([159]) These reforms concern the complementary Arrco and Agirc schemes: the amount of additional pension entitlements generated by every euro of social contributions was reduced, while yearly benefit increases became less generous.

4% in real terms). The lower discount rate results in the ADL estimate to rise by 56 pps on average for the euro area, to almost 320% of GDP, with a maximum increase of 77 pps for France. Of the 24 reporting EU Member States, 21 have estimated accrued-to-date liabilities of at least 200% of GDP under the lower discount rate scenario. Even the assumed lower interest rate appears to be on the high side in the current low interest rate environment, pointing to IPLs being higher still. Conversely, a higher discount rate brings down the ADL estimate, by 42 pps on average in the euro area.

Graph III.3: **Accrued-to-date pension liabilities: sensitivity to lower / higher discount rates (2015, %GDP)**



*no data for EL/LU/SE; EU excluding DK; unweighted average.
**Net of assets as Finland's statutory earnings-related pension scheme is partially funded.
***Net of assets accumulated in the Government Pension Fund Global.
Source: Calculations based on Eurostat, www.nbim.no and Finnish Centre for Pensions.

III.4. Implicit pension liabilities derived from the long-term projections in the Ageing Report

The long-term pension expenditure projections prepared by the Commission (DG ECFIN) and the Economic Policy Committee (Ageing Working Group) as published in the Ageing Report, make it possible to calculate implicit pension liabilities (IPL) for the open system. Indeed, as annual public pension expenditure is projected up to 2070, benefits include the four areas in Graph III.1, though with a finite horizon for to-be-accrued rights of current and future workers. The Ageing Report projections already incorporate assumptions on demographic and macroeconomic developments, the labour market response of future generations to changes in the pension law as well as the consequences that legislated pension reforms may have on benefit levels.

In a first phase, gross IPL estimates are presented for the base year 2016 on the basis of the 2015 and 2018 Ageing Reports([160]). In a second step, net estimates are calculated. Finally, based on some selected recent examples, the impact of reforms on the estimates is highlighted.

Gross IPL estimates for the open system

Under the open system, gross IPL in 2016 can be calculated as the present value of all future flows of pension expenditures:

$$gross\ IPL_{2016} = \frac{\sum_{i=2016}^{2060}\left(\frac{PE_i}{(1+r)^{i-2016}}\right)}{GDP_{2016}}$$

where PE refers to the projected pension expenditure in nominal terms and r to the fixed 5% discount rate. To allow comparison between Member States, estimates are expressed relative to the base year GDP. The base year for the calculations is 2016 and the end-point is 2060. The estimates include all pension expenditure items, going beyond the strictly earnings-related pension benefits to include, for example, minimum and disability pensions.

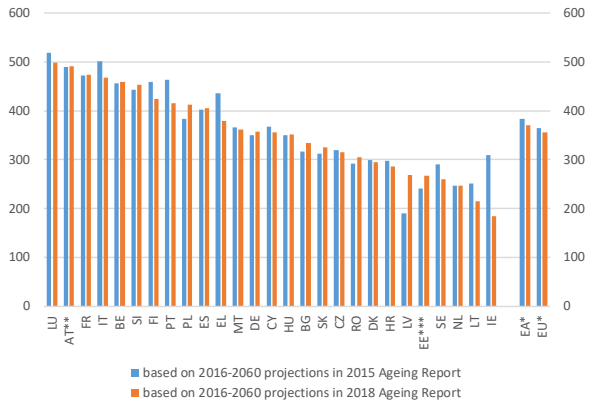
For the euro area, the estimated gross IPL was 371% of GDP in 2016 on the basis of the 2018 Ageing Report (383% on the basis of the 2015 Ageing Report) (see Graph III.4). Despite this broad stability at the aggregate level, there were notable changes in individual countries. Although the same period was considered, the macroeconomic and demographic assumptions underlying the reports often varied significantly and some countries adopted new reforms between the two reporting periods.

The estimates as shown in Graph III.4 do not allow for a detailed allocation of changes between new reforms and updated assumptions. The information in the Ageing Report nevertheless gives an idea about the drivers behind the biggest

([160]) Economic Policy Committee and European Commission (2015), 'The 2015 Ageing Report – Economic and budgetary projections for the 28 EU Member States (2013-2060)', DG ECFIN, European Economy 3-2015. Economic Policy Committee and European Commission (2018), 'The 2018 Ageing Report – Economic and budgetary projections for the EU Member States (2016-2070)', DG ECFIN, Institutional Paper No. 79.

changes([161]). For example, in the case of Ireland (123 pps of GDP: 309% of GDP based on 2015 Ageing Report, 185% based on 2018 Ageing Report), it is clear that the substantial upward revision of the GDP is driving the changes. For Latvia (+79 pps-), the revisions of the demographic assumptions are the main cause. For Greece (56 pps-), the strong decline in GDP between the two projection exercises was more than offset by systemic reforms and policy measures to control expenditure growth. In the case of Portugal (48 pps), earlier reforms turned out to have a higher than previously anticipated impact. Finally, for Lithuania (-37 pps-), the reforms that also affected the ADL estimate (see Section III.3) more than compensated for the upward impact of changed assumptions.

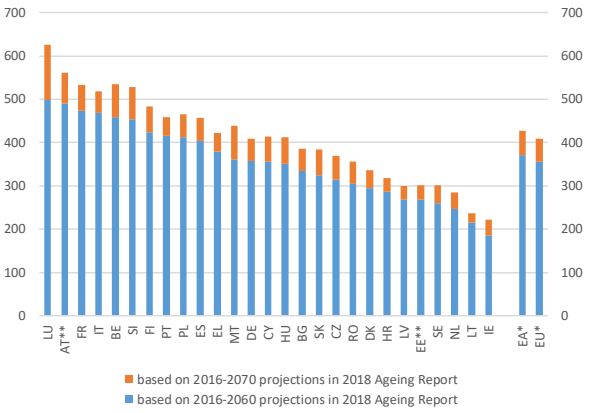
Graph III.4: **Open system implicit pension liabilities, gross (2016, %GDP): Ageing Report 2018 vs Ageing Report 2015**



*unweighted average. **including Ausgleichszulagen and Rehabilitationsgeld. ***including work ability benefits.
Source: Calculations based on projections from 2015 and 2018 Ageing Reports (EPC-EC)

The horizon of the estimates in Graph III.4 is finite: 2060 is the end-point of the 2015 Ageing Report. However, in the 2018 Ageing Report, the projection horizon was extended until 2070. When calculating gross IPL for the open system including this additional 10 years, estimates obviously go up as more rights are included. Gross IPL increases by 54 pps on average (see Graph III.5). While the period under consideration lengthens by about 23%, gross IPL estimates rise by 15% on average as pension expenditure in 2060-2070 is largely discounted. The exception is Luxembourg, with an increase of 128 pps (+26%) under the horizon extension because pension expenditure would continue to rise considerably in the final decade, whereas for most countries pension expenditure is projected to decrease or stabilise towards the end of the exercise.

Graph III.5: **Open system implicit pension liabilities, gross (2016, %GDP):** *2016-2070 vs 2016-2060 horizon*



*unweighted average. **see notes Graph III.4.
Source: Calculations based on 2018 Ageing Report projections (EPC-EC).

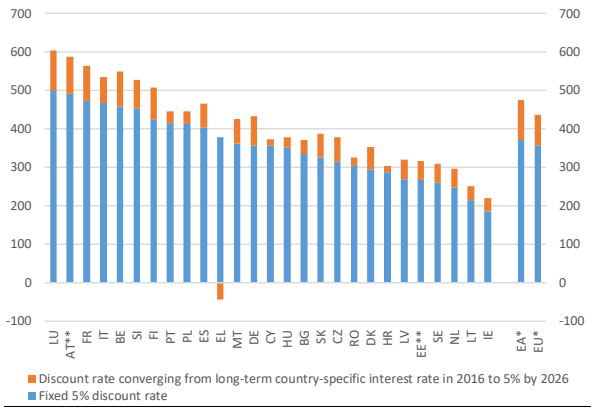
Considering that the above estimates are based on a fixed discount rate of 5% for all countries for the entire period, observed differences between countries are not due to interest rates dynamics. While using a common discount rate improves consistency and cross-country comparability, a 5% cost of capital assumption could be considered high in the current low interest rate environment and risks underestimating the present value of pension entitlements. The Commission's sustainability analysis therefore assumes that the long-term interest rate will converge from current levels to 5% over 10 years([162]). Small changes in the discount rate can cause large compounded effects, as discussed in Section III.3.

When assuming that discount rates will converge from the country-specific long-term market interest rates in 2016 to 5% in 2026 and to stay at that level thereafter, gross IPL estimates go up by around 100 pps on average in the euro area (see Graph III.6). Only for Greece, the phasing-in results in lower IPL as the market reference rate exceeded 5% in 2016.

([161]) The country fiches accompanying the Ageing Report present a breakdown of the difference with the previous vintage in broad drivers. See https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en.

([162]) See the 2018 Fiscal Sustainability Report.

Graph III.6: **Open system implicit pension liabilities, gross (2016, %GDP):** *Impact of discount rate*



*unweighted average. **see notes Graph III.4.
Source: Calculations based on 2018 Ageing Report projections (EPC-EC).

Net IPL estimates for the open system

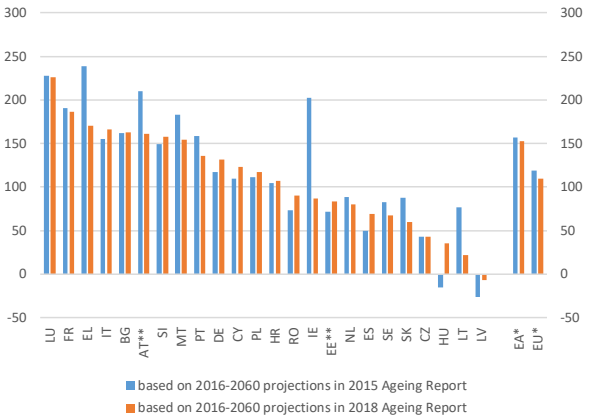
By factoring in future pension contributions, the present value of future deficits or surpluses in the public pension system are obtained. When summed up, these provide an estimate of *net* IPL and of the sustainability of the public pension system as such. The applied formula then becomes:

$$net\ IPL_{2016} = \frac{\sum_{i=2016}^{2060}\left(\frac{PE_i - C_i}{(1+r)^{i-2016}}\right)}{GDP_{2016}}$$

where *Ci* refers to the contribution projections (both employer and employee) in the Ageing Report and r remains fixed at 5%. A positive number for the net IPL estimate signals future deficits in the social security pension system and reveals a need for future policy action.

The net IPL estimates are shown in Graph III.7 for the available countries. For the euro area, taking account of the future pension contributions results in IPL in 2016 of around 150% of GDP([163]). This is considerably lower than the gross IPLs above, although further adjustment (of pension payments of contributions) appear to be needed also for net IPLs to close the financing gap in most cases. Estimates based on the 2018 Ageing Report range from 226% of GDP for Luxembourg to -7% of GDP for Latvia. The slightly negative net present value implies that the overall Latvian pension system, with an NDC old-age component, is expected to be more or less actuarially balanced. Changes compared to the net estimate based on the 2015 Ageing Report are broadly similar with those for the gross IPL estimates discussed previously: reforms in the cases of, for example, Greece, Lithuania and Portugal, and the large denominator effect for Ireland.

Graph III.7: **Open system implicit pension liabilities, net (2016, %GDP): Ageing Report 2018 vs. Ageing Report 2015**



No net IPL estimate is provided for Belgium (no separate pension contribution exists), Denmark (the Danish pension system is quasi completely financed through general taxes) and Finland (contributions were reported in different ways in the 2015 and 2018 Ageing Reports). *unweighte average. **see notes Graph III.4.
Source: Calculations based on projections from 2015 and 2018 Ageing Reports (EPC-EC).

The impact of reforms on the gross/net IPL estimates for the open system: selected examples

Because all underlying assumptions are updated for each projection cycle, one cannot pinpoint the changes that are exclusively due to the reforms by comparing the gross and net IPL estimates from consecutive Ageing Reports. However, when significant pension reforms are legislated between two cycles, projections are updated on an ad hoc basis, using the underlying demographic and macroeconomic assumptions from the latest Ageing Report. Any change in the projections is then entirely due to the adopted pension reforms. Since the finalisation of the 2018 Ageing Report, projections were updated for a few countries.

A Slovakian reform adopted in 2019 removed the automatic adjustment of the statutory retirement age to changes in life expectancy, capping the retirement age at 64 years as of 2030. In addition,

([163]) If the projections up to 2070 set out in the 2018 Ageing Report are used, net IPL estimates increase by 24 pps of GDP on average.

women will be able to retire half a year earlier per child, with a maximum of 18 months. It also set the minimum pension, for those with at least 30 contributory years at 33% of the wage they received in their final two years.

According to the updated projections, the Slovakian reforms increase gross IPL by 72 pps of GDP (see Graph III.8). The increase in the net IPL estimate is higher, at 83 pps, as retirement ages are capped at 64 years instead of rising in line with life expectancy. This has the double effect of individuals receiving pension benefits for a longer period and contributing less.

As to non-euro area countries, there is the example of Romania. In 2019, the Romanian Parliament adopted a new pension law, changing several parameters of the public scheme, which applies a points system. Following ad hoc increases of pension points indexation in 2019-2021, indexation will remain based on inflation plus half of the wage growth, instead of converging to only inflation as previously legislated. As of 2021, the correction index to adjust the initial pension benefit in line with wage growth will be abolished. New pensions will be calculated based on a fixed contribution period of 25 years down from 35 years. Finally, the law makes some changes to the minimum, disability and survivor pensions.

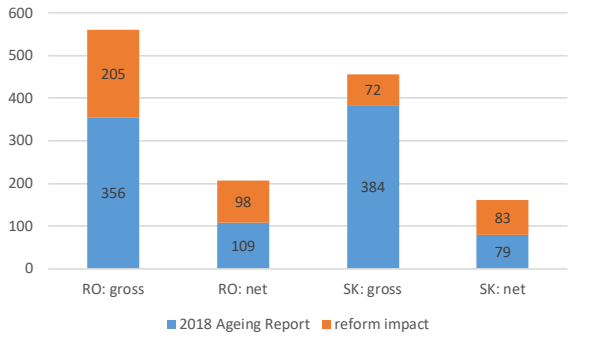
Before the reform (i.e. in the 2018 Ageing Report), gross and net IPL were estimated at 356% and 109% of GDP in 2016, respectively (see Graph III.8). The reform led to an increase of 205 pps of GDP for the gross estimate and the net IPL almost doubled.

The analysis therefore provides interesting insights into the changes of the size of the IPLs, gross and net, as a result of parametric changes to the pension system.

III.5. Concluding remarks

The vast majority of public pension schemes in the euro area have a pay-as-you-go set-up and are therefore unfunded by design, with current contributions being used to pay current benefits. Implicit pension liabilities (IPL) measures existing commitments governments have made through public pension systems over the long-term. New structured statistical reporting of accrued-to-date unfunded public pension liabilities (ESA 2010) enable them to be measured consistently. They also feature in social security policy discussions([164]).

Graph III.8: **Open system implicit pension liabilities, gross & net (2016, %GDP):** *reform impact for Romania and Slovakia*



Based on 2016-2070 expenditure and contribution projections.
Source: Calculations based on 2018 Ageing Report (EPC-EC) and updated projections for RO and SK.

While IPL and conventional, explicit government debt differ significantly, in some situations the implicit liabilities can convert into explicit debt. This is the case when structural shortfalls arise within the pension system, which require financing. In the same way, gross estimates for accrued-to-date IPL give an idea of how costly it would be to liquidate (buy out) past pension promises in the hypothetical case the public scheme is terminated. It is worth stressing that accrued-to-date IPL estimates will yield large, positive values for all countries with pay-as-you-go systems, even those with perfectly balanced schemes. Accrued-to-date IPL are therefore not a measure of fiscal sustainability.

For these purposes, net IPL estimates for the open system – which also consider to-be-accrued rights and expected contributions to the scheme – are better suited. This article presented both gross and net IPL estimates under the open system approach that are consistent with the long-term Ageing Report projections. The net variant provides insights into the extent to which pension systems can be considered underfunded given current policies. The estimates are also useful for assessing the impact of policy changes, especially when the

([164]) See, for example, Boeri, T. (2019), 'Debunking common knowledge to win the battle on welfare', SDA Bocconi School of Management.

underlying demographic and macroeconomic assumptions are similar([165]).

Still, IPL calculations are rather sensitive to the interest rate assumptions, used as a discount factor, and to macroeconomic assumptions in general. In addition, they provide only a partial picture of fiscal sustainability, as developments for other expenditure and revenue items are not considered. For these reasons, one cannot draw firm policy conclusions from IPL calculations on fiscal sustainability. This is why the European Commission uses a set of standard indicators to assess Member States' overall fiscal sustainability.

The medium-term S1 and long-term S2 indicators include, for example, projected changes for all age-related budget items. Moreover, they are expressed as the fiscal adjustment required to achieve sustainability. Such flow indicators are more straightforward to interpret than a present value stock indicators as they give a better idea of the magnitude of a country's actual budgetary challenge.

In conclusion, the analysis of implicit pension liabilities can help identify the future cost of current pension policies as well as the impact of pension reforms on the actuarial balance of the public pension scheme. It can also complement conventional debt and deficit measures, provided the analysis is embedded in a comprehensive fiscal sustainability assessment and the appropriate IPL concept is used.

([165]) The impact of policy changes is fully captured when using the same set of underlying assumptions (demographic and macro-economic).