

# **Employers' unfunded insurance schemes and GDP – practical and conceptual issues in estimating employers' imputed social contributions, imputed assets, liabilities and property income.**

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*The views expressed in this paper are the author's and do not necessarily reflect the opinion of Eurostat.*

## **Introduction**

This paper is a contribution to the IMF's EDG on the treatment of pension schemes. The paper focuses on two issues related to the EDG's discussion of possible alternative treatments of employers' unfunded<sup>1</sup> insurance schemes.

The first issue is the precise meaning of the SNA 93 and ESA 95 guidance for estimating employers' imputed social contributions (D.122) associated to employers' unfunded schemes. ESA and SNA suggest that the ideal source for D.122 estimates would be actuarial calculations. ESA and SNA also seem to imply that the result of D.122 estimates based on actuarial calculations would be similar to estimates based on the unfunded benefits actually paid (D.623) as long as the scheme is in a steady state. However, actuarial calculations as made in practice seem to impute a property income (or impute interest on imputed liabilities) which for employers' unfunded pension schemes results in significantly lower D.122 estimates compared to estimates based on the benefits actually paid. The main purpose of this paper is to seek advice from the EDG on this issue.

The second issue is the practical methods used by EU Member States for estimating D.122 for employers' unfunded insurance schemes of government. Also this issue may be of considerable relevance for the EDG as recommendations on future alternative treatments may benefit from taking into account the feasibility or adequacy of the planned changes.

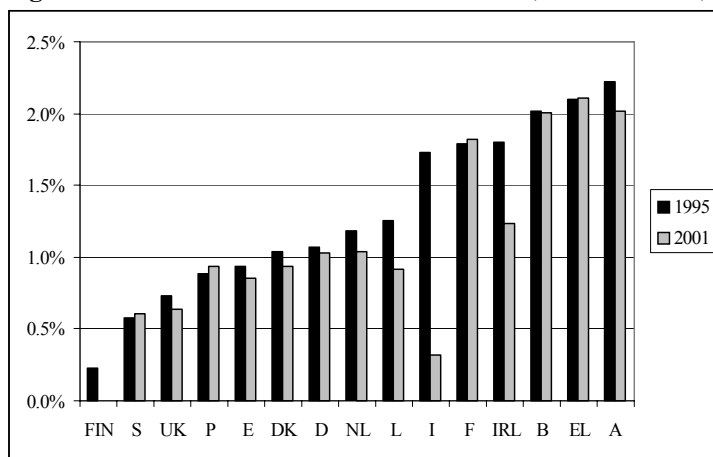
D.122 has an impact on GDP when the employer is a non-market producer. Hence, changing the method for estimating D.122 will change GDP. In most EU Member States it is indeed the government sector's D.122 that accounts for the majority of total economy D.122 (around 65% of total economy D.122 for the EU as a whole). In 2001, government D.122 represented between zero and 2.2% of GDP in EU Member States. In a few countries this share declined significantly between 1995 and 2001 whereas in most countries the share was quite stable, see figure 1. Significant reductions in government D.122 generally reflect a change from an employer's unfunded scheme to another scheme. The social benefits covered by the unfunded schemes vary a lot across countries but pensions dominate (see section 2 for detail).

This paper first provides a summary of the current ESA and SNA guidance for estimating D.122 (section 1). For ease of exposition, the paper then describes the methods that can be used to estimate D.122 (section 2) and based on that identifies the conceptual issues related to using actuarial calculations as a source (section 3). Finally, the paper offers some interim conclusions for consideration by the EDG (section 4).

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<sup>1</sup> An 'unfunded' scheme does not create special reserves or accumulate assets to pay (future) benefits. Instead, the benefits are paid out of the own resources of the employers that operate unfunded insurance schemes for their own employees, or benefits are paid out of current taxes or social contributions as is common for government social security schemes.

**Figure 1: Government D.122 in EU countries, in % of GDP, 1995 and 2001**



Source: Eurostat New Cronos

## 1. Current ESA 95 and SNA 93 principles

ESA and SNA classify social insurance schemes into 3 categories:

- *Social security schemes* operated by government (often pay-as-you-go (PAYG) schemes; benefits not necessarily linked to contributions; units classified in S.1314; no service charge)
- *Private funded social insurance schemes* (benefits typically linked to contributions)
  - Insurance companies and autonomous pension funds (units classified in S.125; service charge)
  - Non-autonomous funds (units classified in the sector of the employer; no service charge)
- *Unfunded social insurance schemes* operated by employers (no separate units; transactions are classified in the sector of the employer; no service charge)

*Social insurance schemes organised by government for their own employees are classified either as private funded schemes (if special reserves are recognised) or as unfunded social insurance schemes. (SNA 8.63)*

Employers' imputed social contributions (D.122) are associated to employers operating unfunded social insurance schemes. These employers may be regarded as operating 'ancillary social insurance funds'. In practice, unfunded social benefits paid (D.623) are observable whereas the associated D.122 as part of compensation of employees (D.1) needs to be estimated. These imputed transactions are then re-routed in the same way as employers' actual social contributions to households and back to the employers' sectors (i.e. to the ancillary social insurance funds), as households' imputed social contributions (D.612). The principal purpose of imputing D.122 is to correctly estimate labour costs.

Of these three flows, only changes to D.122 could have an impact on GDP via the level of compensation of employees. For market producers this change would be offset by an equivalent change in operating surplus. Hence, the only impact on GDP would be via valuation of non-market output.

There could also be an impact on the balance of compensation of employees paid to/received from the rest of the world and hence on GNI (formerly known as GNP). This effect is likely to be small for most countries. An exception may be countries where a significant number of employees of international organisations are resident when these international organisations operate unfunded social insurance schemes for their employees. For example, Belgium records D.122 flows from the rest of the world, sub-sector S.212 - EU institutions.

Changes to D.122 can also have effects for other types of analysis. For example, as D.612 is by definition equal to D.122, there can be an impact on 'tax burden' analysis and the ratio of taxes and social contributions to GDP.

ESA 95 (§ 4.99) and SNA 93 (§§ 7.45-7.47) state that, in principle, the amount of D.122 should be determined by reference to the employers' future obligations to provide benefits. The imputed value should be "...equal to the amount of social contributions that would be needed to secure the de facto entitlements to the social benefits the employees accumulate. These amounts depend not only on the levels of the benefits currently payable but also on the ways in which employers' liabilities under such schemes are likely to evolve in the future as a result of factors such as expected changes in the numbers, age distribution and life expectancies of their present and previous employees." Their value should be "*based on the same kind of actuarial considerations that determine the levels of premiums charged by insurance enterprises.*" (Emphasis added by the author.)

Both ESA and SNA accept that the actuarial estimation of imputed social contributions is often not possible in practice. ESA (§ 4.99) and SNA (§ 7.46) state that

"in practice, however, it may be difficult to decide how large such imputed contributions should be. *The enterprise may make estimates itself, perhaps on the basis of the contributions paid into similar funded schemes, in order to calculate its likely liabilities in the future.* Otherwise, the only practical alternative may be to use the unfunded social benefits payable by the enterprise during the same accounting period **(after deducting actual contributions made by employees themselves)** as an estimate of the imputed remuneration that would be needed to cover the imputed contributions. *While there are obviously many reasons why the value of the imputed contributions that would be needed may diverge from the unfunded social benefits actually paid in the same period, such as the changing composition and age structure of the enterprise's labour force, the benefits actually paid in the current period (less employees' social contributions) may nevertheless provide sufficient estimates of the contributions and associated imputed remuneration.*" (Note: the phrases in bold only appear in the ESA.)

A key issue raised in this paper is the precise meaning of the ESA and SNA statements above, and in particular the statements put in italic. One possible interpretation is that ESA and SNA suggest that:

- in principle the ideal basis for estimating D.122 would be actuarial calculations,
- the employer's own (actuarial) estimates should be used where available,
- benefits paid provide a good approximation for D.122 when the composition and age structure of the work force and other key characteristics of the unfunded employer's scheme are stable over time.

For employers unfunded pension schemes, the ESA (ESA 95 § 4.99) is more specific than the SNA by stating that

"When as a result of political events or economic changes, the ratio between the number currently employed and the number receiving pensions changes appreciably and becomes abnormal, the value of the imputed contributions for current employees should be estimated, and will be different from the actual value of the pensions paid out. A reasonable percentage of wages and salaries paid to current employees can be used for this purpose."

Although not relevant for estimating D.122, it may be worth noting that the ESA seems to be more explicit also on the issue of insurance technical reserves (F.6). ESA 95 § 5.101 states:

"Provisions or similar funds constituted by employers to provide employees with pensions (non-autonomous pension funds) *are only included in category AF.6 if they are calculated according to actuarial criteria* similar to those used by insurance corporations and autonomous pension funds. Otherwise, these provisions are covered by the shares or other equity issued by the institutional unit that sets up the provisions."

## 2. Methods for estimating government D.122

EU Member States use different methods to estimate government D.122. Several Member States estimate all or most of government D.122 based on the unfunded employee social benefits paid (D.623), less employees' contributions. This method is called the *benefits-paid method* in this paper. Some Member States use a percentage of wages and salaries as the main method (*wage-share method* for short). The wage-share is derived from various sources such as the contribution rates used in other (funded or unfunded) schemes or

contribution rates derived from actuarial estimates undertaken by government for its employers' unfunded schemes. In some cases, the source data are *notional employers' social contributions* explicitly shown in the accounts of government. These are amounts calculated by government and shown in its accounts but which are not actually paid to another institutional unit. Some Member States use a mix of methods, i.e. different methods for different schemes, different groups of government employees or different government sub-sectors.

The methods chosen reflect the specific situation in a country. The importance of unfunded schemes operated by government for its own employees varies a lot across countries. In some countries these schemes have been largely or completely abandoned. Also the characteristics of the schemes are very different. The schemes may cover all or most government employees or only specific groups (only officials, only the military, etc.). The unfunded benefits vary very widely. In some countries the unfunded schemes cover mainly those paid to current employees (such as health benefits, sick leave or maternity leave), in other countries only pensions for former employees. Employees may or may not pay some contribution to the schemes. In some countries the number of employees covered by the scheme has been increasing for decades. In other countries the government policy in recent years has been to reduce the number of employees covered by such schemes gradually, or to change to a different scheme at once. This diversity makes clear that a method that produces good estimates for one country or scheme may be inadequate for the circumstances in another country or scheme.

In addition to the two main methods to estimate D.122 (benefits-paid and wage-share method) two variants may be identified:

- A *benefits-paid method with a correction factor for pensions* was discussed by the EU GNP Committee in 1996. This method includes determining a correction factor to be applied to pensions paid when estimating D.122.
- In addition, the *ideal* method that ESA and SNA would *in theory* prefer in the absence of actuarial calculations undertaken by the employer would be a *full actuarial estimate undertaken by national accountants*. This could be seen as a special case of the wage-share method where the wage-share is not derived from external sources but is calculated by the national accountants on the basis of their own actuarial models.

Therefore, four methods could be considered. Their main characteristics are summarised below.

**A) (Pure) benefits-paid method.** D.122 and D.612 are set equal to the unfunded benefits paid (less employees' contributions to the unfunded scheme if any).

For government, the method is generally easy to apply. Data on unfunded benefits paid and on employees' contributions are available from the accounts of government units. For pensions, this method is acceptable as long as the ratio between the number of currently employed and the number receiving pensions is stable and normal and as long as there are no other major changes to the scheme. For voluntary benefits and for sick leave pay this method yields sufficiently plausible results.<sup>2</sup> Roughly half of the EU Member States mainly use this method.

**B) Benefits-paid method with correction factor for pensions.** The EU's GNP Committee in 1996 suggested a specific way to estimate a factor to be applied to *pensions paid by government to civil servants* so as to determine (the relevant part of) D.122 and D.612 from D.623. The factor proposed was the ratio between a 20 years average ratio and the current year ratio of the number of employees (na) to persons receiving pensions (np). D.122 related to pensions would then be determined by the pensions paid multiplied by the correction factor:  $(\text{current na/np}) / (\text{average na/np})$ .

This method makes it possible to keep using benefits paid as the basis for estimating D.122 under circumstances where the (pure) benefits-paid method would produce weak results. Using a moving average can be seen as an extremely simple actuarial account. For each scheme, the pensions paid and long time

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<sup>2</sup> ESA 95 explicitly states in § 4.07 b and in a footnote to § 4.10 that the temporary pay of wages and salaries in the case of sickness, maternity etc. is to be shown as D.122 with the same amount (i.e. the benefits-paid method should be used in these cases).

series of the number of employees and pensioners are needed. Experience with applying this method suggests that it is most appropriate for shorter-term fluctuations in the labour force and stable entitlements to benefits. Very few countries seem to use this method.

**C) Wage-share method.** The value of D.122 and D.612 is estimated using a reasonable percentage of wages and salaries paid to current employees (D.11). The ‘reasonable percentage’ could be derived from actuarial estimates made elsewhere (ideally by some government department) or from the ratio of social contributions to wages and salaries of employees covered by another scheme.

Depending on the source, there are several issues that should be taken into account when transferring wage-shares from actuarial estimates or from another scheme. These issues are discussed in detail below.

**D) Full actuarial estimates made by national accountants.** This method would mean to base estimates of D.122 and D.612 on the number of active employees (including former employees not yet retired that hold pension rights) by gender, age, marital status, salary level, etc. This would have to be combined with projections of the level of (future) benefits receivable, retirement age, mortality, rates of disability, withdrawal from service, future salary increases, inflation, etc.

When such calculations are not already available from other parts of government, the workload for national accountants to run such models could be prohibitive because a huge amount of input data is needed and the estimates must be revised regularly. Many parameters could change rather quickly due to government policy (incl. number and composition of employees, gender and age distribution and the rules governing the level of future benefits receivable). In several EU countries the unfunded schemes differ significantly across government sub-sectors and across specific groups of government employees. Hence, several actuarial models would have to be set up and maintained.

### Conclusions on the methods

- The standard *benefits-paid method* is simple to use. The method produces good results in stable conditions (stable entitlements to benefits, labour force, etc.). It is a correct method for some benefits that are related to current employees. It may also be the appropriate method for small groups of employees under an unfunded pension scheme. The method is not appropriate when for a large scheme significant changes in the labour force or the future benefits occur.
- The *benefits-paid method with a correction factor* produces more stable results in the face of changes in the labour force. There is a problem determining the ‘correct’ average. A moving average is not necessarily ideal and produces time lags in D.122, e.g. when the labour force is expanded or contracted over a long period of time. The method is not useful when changes to the scheme occur such as changes in the level of entitlements to benefits or the retirement age, or changes in the coverage of the scheme. The method may be difficult to use in countries where different parts of government use unfunded schemes with different characteristics.
- The *wage-share method* requires establishing appropriate wage-shares and information on the (relevant part of) wages and salaries of current employees. The wage-share method would be the method of choice, except in circumstances where it can be assumed that the benefits-paid method produces reliable results.
- *Full actuarial estimates made by the national accountants* do not seem feasible due to their resource intensity. ESA and SNA do not suggest that in practice the national accountants should produce actuarial estimates when these are not available from the employer.

### When is the benefits-paid method inappropriate?

The benefits-paid method treats unfunded social insurance schemes essentially like pay-as-you-go schemes. The ESA and SNA imply that if the scheme is in a steady state, the result of the benefits-paid method is consistent with actuarial estimates.

The principle of ESA and SNA is that D.122 should be estimated in such a way that the costs of labour are correctly measured at the time when the work is done. This means that the appropriateness of the benefits-paid method needs to be checked for those types of benefits where there is a risk of a significant intertemporal discrepancy between the period in which the benefits are paid and the period in which the entitlements to the benefits accrue. These will be old age and health insurance for pensioners and survivors.

One could of course argue that family allowances, maternity benefits, unemployment benefits, insurance against accidents at work or health insurance for employees will all be sensitive to the age and gender composition of the work force. However, in practice significant intertemporal effects would only arise when e.g. the age and/or gender composition of the employees covered is extreme. Typically, therefore, unfunded employer schemes are only a real issue in the case of pensions and of health insurance for pensioners. (Pensions schemes are indeed the dominant component of employers' unfunded schemes in the EU.)

It may be useful to list a number of cases that could make the use of the benefits-paid method inappropriate. The cases mainly reflect current trends, i.e. away from using employers' unfunded schemes:

1. Government changes to another system for current employees but keeps paying unfunded benefits to pensioners that retired prior to the change in the system.
2. The pension system for some part of government employees changes, for example as a side effect of privatising some functions of government (e.g. telecoms, railways).
3. From a certain date onwards, all *new* government employees are insured privately or through the government-run social security system (i.e. the unfunded scheme is closed to new members). A variant of this case could be that in a country where only officials are covered by the unfunded scheme the government changes the policy for making government employees officials. This effect could be particularly pronounced if government offers early retirement to officials as a one-off measure.
4. For some years, government does not hire new employees to replace those retiring. This leads to a gradual change in the ratio between current and former employees covered by the unfunded scheme.
5. Government raises the pension age or changes the level of benefits receivable.
6. Government persistently increases the number of current employees that are covered by the unfunded scheme. (This appears to have been more common in the 60s and 70s than it is today.)
7. All government and non-government pensioners live ever longer while everything else is stable. Benefits paid will increase and the ratio between current employees and pensioners will change due to increased life expectancy.

In case 1 it would be wrong to keep imputing any D.122. If the members of the unfunded scheme are put under the general social security scheme, government will typically pay actual employers' contributions that are determined as a share of wages. The D.122 flow will be replaced by a D.121 flow of similar size (unless the system change is coupled with changes in the level of future benefits, etc.). If the unfunded scheme is *replaced* by a private funded scheme, there will a large capital transfer recorded as D.99. D.122 flows will be replaced by D.121 flows but their size will be lower by the amount of property income (less service charge) on the capital transferred as will be shown in section 3.

In cases 2 to 6 there would be a need to adjust D.122 estimates. Case two, if significant, may require an immediate adjustment. The effects of cases 3 to 6 will often need some years to produce a significant bias, except for significant early retirement measures. For example, the changes to the pension age for government officials that have recently been introduced (or are currently being discussed) in several European countries typically foresee that the pension age increase is higher for young employees and does not apply at all to employees beyond a certain age (e.g. those aged 50 or more). In such a case, the change has no impact on the benefits paid for another decade and will then start to have a downward impact on the trend in benefits. A priori it cannot even be said whether the change increases or decreases the quality of a D.122 estimate based on the benefits paid.

In case 7, the quality of an estimate of D.122 based on benefits paid would not seem to change much as also government pay-as-you-go systems and private funds would increase contributions (or reduce benefits) by a similar proportion.

It is clear that when the size of government D.122 is significant, the method for estimating D.122 needs to be reviewed on a case-by-case basis when there is a significant change in the characteristics of an unfunded scheme.

### **Issues to be considered when determining wage-shares**

The wage-share method requires determining an appropriate basis (the wages and salaries of the employees covered by the unfunded scheme) and appropriate wage-shares. Actuarial estimates made by government for

its unfunded social insurance schemes would probably be the best source. A wage-share could also be estimated from the contribution rates applied, or the ratio of social contributions, to wages and salaries of employees covered by a funded scheme. Ideally this funded scheme would cover a segment that is similar to the government work force in its composition and entitlements to benefits (for example a funded scheme for a group of government employees). If such sources are not available or are not representative of the government work force, rates derived from government social security schemes could be used.

Depending on the source, different adjustments to the observed ratio or rate may be needed to account for several factors such as:

- the basis for observed contribution rates could differ from the gross wages and salaries (D.11). For example, the pensionable pay for determining pension contributions could exclude income tax withheld by the employer, or include wages and salaries paid temporarily in the case of sickness or maternity.
- Observed rates taken from funded schemes would have to be adjusted upwards for property income (D.44) as for unfunded schemes there is no property income. The same may hold for government actuarial estimates if these estimates include a notional return on a notional asset. (The issue of property income is discussed in more detail in section 3.)
- Rates derived from private funded schemes may also need to be adjusted for the service charge, the difference between a private and a government rate of discount and other assumptions used in the private fund's actuarial calculations. (The issue of discounting is discussed in more detail in section 3.)
- Government social security schemes are themselves not based on actuarial considerations but are often pay-as-you-go and part-funded by taxes. An adjustment may be needed e.g. for the part that is tax funded.
- The composition of the labour forces under the source scheme and the unfunded social insurance scheme may differ in terms of e.g. age and gender composition, or salary levels of the work force. This could result in different levels of benefits payable (if benefits paid depend on salary levels), different average life expectancies (e.g. due to gender) and levels of unfunded benefits payable to current employees (e.g., health benefits may be sensitive to age). Adjusting for such differences could be difficult in practice.
- A particular issue may be the types of social benefits (health, unemployment, accidents, pensions) covered by the unfunded social insurance scheme and whether the scheme applies to all government employees or not. Several countries run mixed insurance systems for government employees with a part of the government employees fully covered by a government social security scheme and another part (e.g., only officials, or only teachers or the military) covered by an unfunded social insurance scheme. For the latter group of employees, some social protection functions (such as health or accidents) may be insured via the government social security scheme whereas other benefits (such as pensions) are covered by the unfunded social insurance scheme. Insurance against unemployment may be very low or may not exist for some groups of government employees (e.g. officials may have a de facto job guarantee). It would be necessary to find detailed data for the groups of employees and the types of benefits of interest – e.g. health and pension insurance of officials – and adjust observed rates for any differences in the benefits covered.
- The levels of (future) benefits may also differ. There may be differences in the profile of income over the lifetime of employees. For example, in some countries the profile of income from salaries and pensions over the lifetime of civil servants (incl. successors receiving pensions) differs quite a lot from the profile of private sector employees. Typically, young civil servants' salaries are lower than in the private sector, but keep increasing over the whole active period, and pensions are a higher share of final pay, with a break-even point somewhere in the 40s of the government employees. In such circumstances the D.11 which is the basis for the D.122 estimate could itself be sensitive to the age composition and the wage-share may need to be adjusted (usually upwards) to take account of differences in the income profile and in pension levels as a share of final pay.

### **Conclusions on the wage-share**

It appears that the ideal source for the wage-share would in principle be actuarial estimates specifically made for the government employees covered by the unfunded scheme. An adjustment for property income will typically be needed in this case (for detail see section 3). Deriving a wage-share from a funded scheme may, in principle, be another option. However, there could be substantial difficulties due to many adjustments that may need to be made when transferring the wage-share. The adjustments in turn could require a lot of data

and a detailed understanding of the actuarial methods and assumptions underlying the contribution rates of the private funded schemes. When government operates a funded scheme for some groups of its employees, this approach may be more feasible. When actuarial estimates for government unfunded social insurance schemes are not available, a simple option is to derive a wage-share from the government social insurance scheme (taking both the employers' and the employees' rates as appropriate).

### **Notional employers' social contributions shown in the accounts of government**

Some EU governments have started to show notional employers' social contributions in their accounts. This has been done to better reflect the costs of those employees that are covered by employers' unfunded schemes. In this paper, notional employers' social contributions are understood to be 'notional' in the sense that the contributions are not paid to another institution but are returned to e.g. the Ministry of Finance which pays the pensions. These payments are also 'notional' in the sense that the budgets of individual ministries or departments are initially raised by the amount of the contributions to be paid. Nevertheless, these notional contributions do have a real economic effect: for a ministry the employees covered by the employer's scheme become more expensive relative to other government employees.

In the EU, notional employers' social contributions shown in government accounts are not a homogeneous category. They may be based on full actuarial assessments, on a 'reasonable' fixed percentage, or on 'pay-as-you go' considerations.

### **3. Imputed assets and liabilities, imputed property income and discounting**

ESA and SNA state that D.122 "should be based on the same kind of actuarial considerations that determine the levels of premiums charged by insurance enterprises." Thus, private funded schemes are, in principle, the reference system for D.122 calculation. There is an important difference, however. Private funded schemes create assets for the policyholders. The assets generate property income attributable to the policyholders (D.44) which results in lower premiums compared to a situation with no asset and no property income. For pension schemes the difference can be very significant, reducing the contribution rate by an order of 30-50%.

For unfunded employers' schemes, ESA and SNA foresee imputed employers' contributions but do not foresee *imputed* insurance technical reserves and associated property income of policyholders and (imputed) changes in net equity of households on pension funds. Nor do ESA and SNA foresee employers' imputed liabilities<sup>3</sup> for unfunded schemes.

The boundary between 'funded' and 'unfunded' employers' schemes is open to debate, however. For example in Canada the government accounts show a notional asset for the Canadian armed forces superannuation scheme that is charged with benefits payments and credited with investment earnings *as if* the fund was invested in 20-years government bonds. In such a case the question is whether the scheme is still unfunded.

For unfunded employers' schemes, this suggests that to be in line with the current ESA and SNA the D.122 should be determined by actuarial considerations with respect to all relevant factors such as age distribution, mortality, future benefits, etc., but *excluding* imputed property income. This is both a conceptual and a practical issue. In practice, the actuarial calculations that are available for unfunded employers' schemes usually seem to work with a real rate of discount that is equivalent to a real rate of return on a notional fund (this will be discussed in more detail below).

Another argument for excluding imputed property income is that the current ESA and SNA suggest that the benefits-paid method is acceptable, in particular when the age structure or composition of the work force is stable over time. The results of the benefits-paid method and the wage-share method are only similar for

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<sup>3</sup> However, the Australian and Canadian national accounts recognise such 'imputed' liabilities for government which raises government debt by some 50% in Australia and 20% in Canada, see Lequiller 2003. It appears, though, that these governments officially recognise these liabilities.

such a stable scheme when the wage-share is set at a level that excludes property income (and excludes a service charge). Thus, when the private funded and the unfunded scheme are identical with respect to the structure of its members, employee's contributions and future benefits, the following should hold:

(1) Employer's imputed contributions to an unfunded scheme *are equivalent to* employer's actual contributions *plus* property income (or premium supplements) *less* service charge for a funded scheme.

However, the question whether for a stable scheme the D.122 estimates based on actuarial calculations are similar to benefits paid is not trivial. In essence, the benefits-paid method treats the unfunded employer scheme like a pay-as-you-go scheme. In a pay-as-you-go scheme, however, there are also mechanisms that amount to a built-in 'property income' element. For example, the wages and salaries that are the typical basis for contributions will, in addition to being inflation-adjusted, typically rise in real terms over time.

At a conceptual level, the economic meaning of imputing D.122 and D.612 but not allowing for property income is debatable and may be an issue for future revisions of ESA and SNA. ESA and SNA consider D.122 a part of labour costs. This implies an obligation of the employer to pay (future) benefits. At least for pensions, D.122 is in fact a deferred payment, i.e. an imputed payment of D.122 which is then returned as imputed D.612 to be used, in principle, at a later stage by the employer to pay social benefits. D.122/D.612 could be seen as creating a loan by the employee to the employer. (This is indeed how e.g. the Canadian or the UK governments view some unfunded schemes for their employees.) Not allowing for D.44 increases D.122 compared to a funded scheme and is equivalent to a zero interest rate on the employer's liability.

Government unfunded social insurance schemes for its own employees will generally be defined-benefits schemes. (This does not exclude the possibility of government to adjust the (future) benefits.) In line with the current ESA/SNA the imputed employer's contributions for a year would in principle have to be set as follows for each scheme:

**(2) Liability on 1 January less benefits paid plus employees' actual contributions (if any) less liability on 31 December equals employer's imputed contribution.**

This formula makes sure that what would be property income (net of the service charge) in a (fully) funded scheme is included in the imputed contributions for the unfunded scheme. The liability itself should be determined based on actuarial calculations. With a view to being consistent with the current ESA and SNA, a tricky issue still needs to be addressed: that of discounting future benefits of pensioners when determining the imputed liability. Before addressing that issue, we first look at how actuarial calculations typically work.

The typical case for actuarial estimates is a private funded scheme, i.e. the existence of a separate fund (asset) that creates a return and from which future benefits are paid. The asset increases due to new contributions and the return to the asset and decreases due to the benefits paid. The liabilities are determined by the *discounted* value of future benefits payable. To the extent that assets and liabilities do not match, adjustments to either the benefits or the contribution rates are made to take account of the surplus or deficit (ignoring the case of government guarantees that lead to transfers to balance the scheme). Private funded schemes are often defined-contribution schemes, i.e. any imbalance results in the benefits being adjusted. In contrast, unfunded schemes for government employees are typically defined-benefits schemes in which the (employer's imputed) contributions would be adjusted. There are various possible rules for recognising surpluses or deficits, and for distributing them over time. For example, no recognition for an imbalance below 10% of the asset, gradual recognition over a fixed number of years, or instant recognition with the changes in contributions spread over the remaining work time of existing scheme members. In the literature, the liabilities for defined-benefits schemes are sometimes called the 'standard fund', i.e. the notional fund that would make sure that the scheme is never overfunded nor underfunded.

The actuarial profession knows a range of methods to estimate future benefits and determine liabilities and contribution rates. Some depend on age such as the individual entry age method or the normal entry age method. Others work with aggregate benefits (this may involve a degree of distribution among members of the scheme). Some work with unit credits (the benefits accruing in a year to an employee). There has been a move towards the Projected Unit Credit Method in recent years. In the literature, this method is also called the 'projected accrued benefits cost method'. With this method, the contributions are determined by the

present value of the benefits that are projected to accrue in a year. The forecast of future benefits typically includes some projected index of future inflation and future (real) salary increases. Some actuarial estimates use a separate inflation assumption whereas others use projected nominal growth rates of salaries and of future benefits. Future benefits are typically discounted at the projected rate of return on the asset (with some allowance to cover the management costs).

Countries still have quite different national practices and national standards for actuarial estimates. These standards apply to private companies but may also be used by governments. For example, the UK government has recently moved to using FRS 17 (one of the UK Accounting Standards Board's Financial Reporting Standards). FRS 17 sets out the accounting treatment for retirement benefits such as pensions or health care during retirement. For pension scheme liabilities the FRS 17 requires the use of the projected unit credit method and discounting using an AA corporate bond rate. (The UK government uses a real rate of discount of 3.5%.)

At the international level, the projected unit credit method is recommended in IAS 19 which deals with accounting for employee benefits (IAS stands for International Accounting Standard). As to public sector accounting, the Public Sector Committee (PSC) of the International Federation of Accountants had considered to develop an International Public Sector Accounting Standard (IPSAS) based on IAS 19 in two stages: stage one dealing with employee benefits other than post-employment benefits and stage two dealing with post-employment benefits. IAS 19 is currently being reviewed, however. As of December 2002, the PSC thus postponed the development of an IPSAS for employee benefits until the review of IAS 19 is completed. As a consequence, there is at present no international public accounting standard for government unfunded social insurance schemes. However, the PSC's recommendations are usually very close to those for the business sector.

### **Should future benefits of pensioners be discounted at all?**

From a perspective of estimating D.122, the interesting case is when the unfunded scheme is *not* in a long-term equilibrium between contributions and benefits paid. This is the situation where the benefits-paid method would produce weak results for D.122 and where a private funded scheme would generate a positive or negative contribution to (households') saving. Interestingly, in such situations the effect of discounting is that the imputed contributions as calculated by formula (2) become also biased, although less than with the benefits-paid method.

An extreme example to illustrate the effect is an employer's unfunded pension scheme that is closed to new members and where all members have the same age and will retire at the same time. There is no inflation so the discount rate is only the real discount rate. The discounted liability will increase each year by the present value of the *newly* acquired future benefits *plus* the discount rate times the liability at the beginning of the period (i.e. the discounted accumulated future benefits acquired by the end of last year).

The imputed contribution rates calculated with formula (2) would thus include the effect of discounting the future benefits by one year less. This is equivalent to the (imputed) property income on the 'standard fund' and equivalent to the imputed interest that the employer would have to pay on the liability at a rate equal to the discount rate. Applying formula (2), the contribution rate will increase each year up to the point of retirement of all members of the scheme<sup>4</sup> because the liability keeps increasing. However, the employer pays this 'imputed interest' in the form of a component of imputed contributions to current employees.

Even so, the liability at the point of retirement of all members will be lower than the total benefits that will have to be paid in future periods. The liability will decline by the amount of benefits paid but will continue to increase at the rate of discount. In the example of the closed scheme above, after all members have retired, the employer would have to keep paying imputed interest on the remaining liability until the liability

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<sup>4</sup> Reality is less extreme than this example but the phenomenon exists. For example, the Australian Government Actuary's report on the Military Superannuation and Benefits Scheme (MSBC) and the Defence Force Retirement and Death Benefits Scheme (Commonwealth of Australia 2000) states that the calculated notional contribution rates for the MSBS increased from 20.9% to 22.3% between 1996 and 1999 because "as a scheme's membership structure matures, the use of the projected unit credit method results in small increases to the contribution rate."

disappears. As in this example there is no D.122 flow any more the question arises how to deal with this discrepancy. (To record each year a real holding loss that was initially built into the calculation does not seem to be entirely satisfactory.)

In practice, D.122 may be estimated based on observed contribution rates or ratios taken from comparable private funded schemes or from actuarial estimates made for the unfunded social insurance schemes operated by government. To the extent that these sources include a return to an actual or notional fund, the contribution rates derived would have to be adjusted upwards. However, as we have just seen, this is not enough. When a scheme is not in long-term equilibrium the only strictly correct way to compile D.122 would be to remove all effects of discounting from the actuarial estimates.

Along this line of reasoning it could be claimed that when strictly applying the current ESA and SNA, the real rate of discount for future social benefits should be set to zero when determining the liability for formula (2). Otherwise, to the extent that the characteristics of an unfunded scheme are changing, the imputed contributions will include an intertemporal adjustment and will not correctly reflect the labour costs of current employees 'in the period when the work is done'. (If the view is that also pay-as-you-go schemes include an 'allowance' for property income in the form of increases in wages and salaries in real terms, the discount rate should equal this real rate of increase.)

The need for reviewing and adjusting contribution rates raises practical issues that significantly complicate the transfer of contribution rates from private funded schemes and from actuarial estimates for government unfunded social insurance schemes. The question may be raised whether the quality of D.122 estimates based on actuarial estimates is really superior to estimates derived from other sources, and if so, whether this improved quality is achieved in a cost-effective way. Wage-shares derived from sources other than actuarial estimates or private funds may be an appropriate method for schemes that are not in a steady state.

In many cases a method other than the benefits-paid method will produce a better estimate of D.122 and of D.612. In the current ESA and SNA, this difference does not affect the saving of the employers and households. This obviously raises another question: how to interpret the difference between D.612 and the benefits paid (D.623)? For a funded scheme, the equivalent to this difference would be the change in the net equity (D.8).

#### **4. Draft conclusions**

A) The SNA 93 and ESA 95 guidance for estimating employers' imputed social contributions (D.122) is not entirely clear, in particular as regards the comparability of estimates produced with different methods and the situations where some methods should not be used. A particular issue is the use of actuarial estimates as a source. (The treatment of benefits in kind might also be an issue for further consideration.) The guidance offered by ESA and SNA also differs in some details. This concerns e.g. the description of the benefits-paid method where the ESA 95 is more explicit by stating that actual employees' contributions should be deducted from benefits paid when estimating imputed contributions. With regard to pensions the ESA specifies that when the ratio between the number currently employed and the number receiving pensions changes appreciably and becomes abnormal a wage-share method should be used to estimate D.122.

B) ESA and SNA treat employers' unfunded schemes essentially like pay-as-you-go social security schemes with no direct impact on saving. With the benefits-paid method there is by construction no difference between benefits paid and contributions. In principle, the ESA and SNA would prefer that D.122 be estimated using some wage-share method so that benefits paid (D.623) and imputed social contributions (D.612 and D.122) should typically differ. This may have an impact on GDP but not on saving.

C) In national accounts practice in the EU, many countries estimate D.122 for government using the benefits-paid method. Several countries use the wage-share method. In aggregate roughly half of the EU total of government D.122 is estimated with the benefits-paid method, and the other half with the wage-share method. When the wage-share method is used, the wage-shares are derived from various sources, including funded schemes for government employees, contribution rates applied by government social security systems, actuarial estimates made by governments or directly by using the notional contributions shown in

the accounts of government. Actuarial estimates made by government and notional contributions (which in turn are based on government actuarial estimates) are mainly available in Anglo-Saxon countries. Some other governments have introduced notional contributions into their accounts which are not actuarially estimated.

D) The current ESA and SNA wording seems to imply that D.122 should ideally be estimated as if the scheme was funded but that D.122 should include an amount that is equivalent to what in a (fully) funded scheme would be the property income (less service charge where appropriate).

E) In practice it seems that actuarial estimates for employers' unfunded schemes of governments typically include discounting of future social benefits at a real rate of discount. If these estimates (or notional contributions derived from these estimates) are used as the source for estimating D.122, an upward adjustment would perhaps be needed to the notional contributions that result from the actuarial estimate. For pension schemes, the effect of discounting is typically large but it is not necessarily very easy to determine the size of the upward adjustment. If employers' unfunded pension schemes are being phased out or their membership reduced, even the adjusted notional contribution rates derived from actuarial estimates will show an upward trend that is inherent in the discounting. Notional contribution rates will still be biased downwards due to the discounting of future benefits of those already retired. Hence, D.122 estimates based on adjusted contribution rates from actuarial estimates as typically made would be of better quality than estimates based on the benefits-paid method but may still be biased, i.e. may not correctly reflect the cost of labour in the period when the work is done.

E) Conceptually, a simple change to the SNA could include an imputed liability for all unfunded employers' schemes in the government's balance sheet that is determined by the discounted future benefits, plus imputed interest flows being credited to this imputed liability, perhaps with interest rate and discount rate being equal. This would result in a lower GDP as government D.122 would be lower.

F) In national accounts practice, however, such a general change to the treatment would entail that many countries would have to change their methods for estimating D.122 and that the national accountants would have to undertake actuarial calculations to calculate the imputed liabilities (unless such actuarial estimates become much more widespread in the coming years). Such actuarial calculations would require a significant amount of input data and a lot of human resources. It is possible that the quality and comparability of national accounts data could be improved more when these resources are used in other ways.

G) An issue appears to be that the degree of recognition of notional contributions and notional liabilities varies widely across governments: no recognition whatsoever; recognition only in reports of government actuaries or courts of auditors; recording of notional contributions in the accounts of government units; recording of notional contributions, notional liabilities and notional property income. A high degree of recognition is correlated with the availability of actuarial estimates.

H) A conceptually not entirely satisfactory but very practical option could include precisely defining what 'segregated reserves/funds' (SNA § 7.45 and Annex IV § 12) means in the case of countries where government recognises a notional liability and treat these as non-autonomous pension funds. A new category 'government notionally funded employers' schemes' could be considered if it is felt that the notional entries in the accounts of government do not quite qualify as a separate set of accounts of a non-autonomous pension fund. The 'really' unfunded employers' schemes of government (where no liability is recognised nor calculated) could be treated as before, i.e. essentially like pay-as-you-go social security schemes.

This paper represents work in progress. The above draft conclusions are intended to contribute to the discussion of the EDG. The paper's principal purposes are:

- To point at the link between estimates of employers' imputed social contributions under the current ESA and SNA and possible alternative treatments of unfunded employer pension schemes, including the practical consequences of possible alternative treatments.
- To seek the EDG's view on the *current* ESA and SNA issue of 'imputed property income' and the effect of discounting when actuarial estimates are available as a source.

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