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**Where and How Should the National Accounts Record Defined Benefit  
Pension Schemes**

**The views expressed in this paper are those of the author and should not be attributed to the  
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**DRAFT**

**Where and How Should the National Accounts Record Defined Benefit  
Pension Schemes**

*Discussion Paper Prepared by Brian Donaghue  
For the Statistics Department of the International Monetary Fund*

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## **Where and How Should the National Accounts Record Defined Benefit Pension Schemes**

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## DRAFT

### Where and How Should the National Accounts Record Defined Benefit Pension Schemes

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## I. INTRODUCTION

### A. Social insurance schemes

**Defined benefit pension<sup>1</sup> schemes** are part of the group of **social insurance schemes**, which provide **social protection** to their beneficiaries, where social protection is defined as systematic intervention to relieve households of the burden imposed by social risks. In the System of National Accounts (the System) social insurance schemes are defined as those “where the policyholder is obliged or encouraged to insure against certain contingencies by the intervention of a third party”<sup>2</sup>, commonly governments or employers. More specifically, an insurance scheme is designated as a social insurance scheme in the System if:

- (a) Social benefits are dependent on participation in the scheme<sup>3</sup>, and
- (b) At least one of the following conditions are met:
  - (i) Participation in the scheme is compulsory; or
  - (ii) The scheme is operated on behalf of a group, and limited to group members; or
  - (iii) An employer makes a contribution to the scheme on behalf of an employee.

In the case of pension systems, the social risk against which protection is provided is the risk of loss of income due to retirement.

A further distinction within social insurance schemes is made between **social security schemes** (which serve the whole population, or large segments of it), and schemes which are provided by employers (including government in its capacity as an employer) to their employees and their dependents—**employer social insurance schemes**.

Employer social insurance schemes are distinguished between those that provide retirement benefits (often called **pension schemes<sup>4</sup>**), and those that do not (**employer non-retirement benefit schemes**). Employer pension schemes can be broadly divided into two main categories, depending on whether the benefits they offer are based on the **defined contribution** or **defined benefit** models.

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<sup>1</sup> The word ‘pension’ in this paper refers to regular post-retirement payments.

<sup>2</sup> SNA93 Annex IV, para 5

<sup>3</sup> Social insurance schemes require the payment of contributions by, or on behalf of, beneficiaries to be eligible for benefits. If no such contributions are made, social protection is classified under social assistance schemes.

<sup>4</sup> The main benefits from such schemes are usually pensions, but other benefits in cash or kind, such as medical benefits, may also be provided.

## **B. Defined contribution schemes**

In **defined contribution pension schemes** (SNA ‘money purchase plans’)<sup>5</sup> the present value of future flows of economic resources to which the beneficiaries (in aggregate) are entitled depends on the value of the current total assets of the scheme. In other words, the total liabilities of a defined contribution scheme are (at least approximately) equal<sup>6</sup> to its total assets. The assets can either be held in an autonomous pension scheme, or as segregated funds which remain under the control of the employer

In a defined contribution the employers undertake to contribute defined amounts to the pension fund, but the amounts eventually received by the employees depend on the investment earnings of these funds, i. e. the employees assume the risks associated with the future earnings of the fund.

## **C. Defined benefit schemes**

**Defined benefit pension schemes** are the topic of this paper. These schemes provide a guaranteed level of future benefits to employees based on some formula. The formulas can vary widely from scheme to scheme, but typically involve factors such as length of service, and wages and salaries earned. The benefits do not depend on funds invested in the past.<sup>7</sup>

In the case of funded defined benefit schemes the employer assumes the risks associated with whether the earning rates on fund reserves are sufficient to pay the associated benefits.

## **D. Funding and autonomy of pension schemes**

Pension schemes can also be characterized on the basis of whether they are funded or unfunded, and the degree of autonomy of the schemes.

In the System of National Accounts the key distinction made between employer pension schemes is between those that are funded versus those which are unfunded<sup>8</sup>.

A funded scheme is one where identifiable reserves have been accumulated to meet the obligation to pay future benefits accrued to the present. An unfunded scheme is one where there are no identifiable reserves assigned for the payment of benefits.<sup>9</sup>

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<sup>5</sup> SNA 1993, 13.79

<sup>6</sup> Defined contribution schemes often involve the provision of annuities to the beneficiaries, where the annuity payments are set at the amount that can be financed from available resources, calculated on an actuarial basis. In this case, the present value of the liability will approximate that of the assets, but they will not necessarily be exactly equal.

<sup>7</sup> SNA 1993, 13.78

<sup>8</sup> SNA 1993, 8.63

<sup>9</sup> SNA 1993, Annex IV paragraph 11

Defined contribution schemes, by definition, are funded schemes, because the benefits depend on the assets which have been generated from the contributions, and related property income, and which are held in an autonomous, or at least segregated, fund and which are sufficient to provide all future benefits. However, **notional defined contribution schemes**, where the benefits are calculated on the same basis as for defined contribution schemes<sup>10</sup>, but where no actual segregated assets are held by the scheme, are unfunded.

Defined benefit schemes are defined within the System as either funded or unfunded, depending on whether segregated funds have been put aside to meet the future demand for payment of benefits or not. However, because the payment of future benefits depends on criteria such as length of service, and level of wages or salaries, there is no direct link between the benefits which will eventually be paid and any funds which have been set aside to meet those obligations. The extent to which such a scheme is funded therefore depends on an actuarial assessment of the net present value of future benefits, relative to the value of the pension scheme assets. Conversely, the obligation to make future payments is not affected by the level of assets held by the scheme, or indeed whether any assets are held at all. In other words, defined benefits schemes can be partially funded and the degree of under-funding<sup>11</sup> can vary greatly. Although the System appears to assume that under-funding would be relatively small and/or temporary,<sup>12</sup> there is no reason why this need be so.

Where a pension scheme is funded, the funds which are assigned to meet pension obligations may be **autonomous** or **non-autonomous**. Autonomous pension schemes have the characteristics of a corporation or quasi-corporation,<sup>13</sup> i.e., they are able to operate independently of their owners, hold assets and incur liabilities in their own right, and provide a full set of accounts. Such autonomous pension funds are considered to be supplying insurance services, and are therefore included in the insurance corporations and pension fund sub-sector of the financial corporations sector.

In the case of non-autonomous pension funds employers maintain special reserves which are segregated from their other reserves, but which do not constitute separate institutional units. For non-autonomous funds the economic flows and balances are integrated with those of the controlling entity, i.e., the assets and liabilities, and associated economic flows, are attributed directly to that entity.

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<sup>10</sup> I.e. as if contributions had been made by the employer to a pension fund.

<sup>11</sup> More rarely, defined benefit schemes can also be over-funded.

<sup>12</sup> SNA 1993, 13.78

<sup>13</sup> Quasi-corporations are entities which are not legally constituted as corporations, but which act in an economic sense as though they are corporations.

Where a pension scheme is funded, and irrespective of whether it is autonomous or non-autonomous, the System treats those funds as being the property of the beneficiaries, and not of the units controlling the scheme.<sup>14</sup>

## **II. TREATMENT OF PENSION SCHEMES IN SNA 1993**

The current treatment of the flows and balances of employer pension schemes in the System can be summarized as follows:<sup>15</sup>

- 1) The output of autonomous pension funds is recorded in the Production Account of the insurance corporations and pension fund sub-sector. No output is recorded for non-autonomous pension funds, the costs of the pension scheme being combined with other costs of the employer.
- 2) Employer's actual contributions to funded employee pension schemes, and imputed contributions to unfunded employee pension schemes, are treated as part of compensation of employees – payable by the sector of the employer in the Generation of Income Account and receivable by the household sector in the Allocation of Primary Income Account.
- 3) Property income attributed to policyholders from the investments of funded pension schemes is recorded in the Allocation of Primary Income Account as receivable by the household sector, and payable either by the insurance corporation and pension fund sub-sector – for autonomous pension funds, or by the sector of the employer operating the schemes – for non-autonomous pension funds
- 4) The employer contributions to pension schemes, plus employee contributions (if any), are treated as payable by the household sector in the Secondary Distribution of Income Account. The receivable sector depends on whether the pension fund is autonomous or not. If the fund is autonomous the contributions are receivable by the insurance corporation and pension fund sub-sector. Otherwise the contributions are receivable by the sector of the employer. The service charge payable by the household sector, and receivable by the insurance corporations and pension fund sub-sector in respect of autonomous pension funds is subtracted from contributions and recorded in the Use of Disposable Income Account.
- 5) Where the pension scheme is funded, the property income earned on fund investments is treated as supplementary contributions, payable and receivable by the same sectors as the primary contributions, in the Secondary Distribution of Income Account;

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<sup>14</sup> SNA 1993, 11.93

<sup>15</sup> SNA 1993, Annex IV paragraph 49

- 6) Pension benefits are treated as receivable by the household sector and payable by the sector operating the pension fund in the Secondary Distribution of Income Account;
- 7) The value of the insurance service (for autonomous pension funds) is recorded as payable by the household sector in the and receivable by the insurance corporation and pension fund sub-sector in the Use of Disposable Income Account;
- 8) The assets of funded pension schemes are treated in the Balance Sheet as assets of the household sector<sup>16</sup>. In any period those assets will increase by the value of primary employer and employee contributions, plus supplementary contributions, less pension benefits, and less the insurance service charge (where applicable).<sup>17</sup> They may also be affected by holding gains and losses, and other changes in the value of assets, during the period;
- 9) Because the treatment of contributions and benefits for funded pension schemes in the Secondary Distribution of Income Account is inconsistent with that in the Balance Sheet, an adjustment item is included in the Use of Disposable Income Account. This item, the *adjustment for the change in net equity of households in pension funds*, allows reattribution of saving relating to pension funds from the sectors operating pension funds to the household sector. This adjustment item effectively offsets the payables and receivables (net contributions less benefits payable) in respect of contributions and benefits shown in the Secondary Distribution of Income Account.
- 10) The increase in saving of the household sector resulting from the adjustment for the change in net equity of households in pension funds in the Use of Disposable Income Account is recorded in the Financial Account as net equity of households in pension fund reserves – a change in financial assets of the household sector and in liabilities of the sectors operating pension funds.
- 11) For defined benefit plans, changes to the actuarially determined liability that result from changes to the benefits structure<sup>18</sup> are recorded in the Other Changes in the Volume of Assets Account, while changes to prices of assets held by funded schemes are recorded in the Revaluation Account.

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<sup>16</sup> SNA 1993, 13.75

<sup>17</sup> However, as discussed further below, this appears to be inconsistent with other recommendations of SNA 1993, which imply that the pension liability/household asset for defined benefit schemes is the net present value of future benefits payable for service provided to the current date.

<sup>18</sup> E. g. changes in the formula, reductions in the pensionable age – SNA 12.53



Defined benefit pension schemes are unlikely to be autonomous schemes (although this is technically not impossible<sup>19</sup>) because the benefits payable are so closely related to the employment history of the beneficiary, and the ultimate value of the benefits which will be paid tend to be open ended<sup>20</sup>. However, all the other characteristics of pension schemes listed above could apply. With relatively minor exceptions<sup>21</sup>, all unfunded pension schemes are defined benefit schemes.

### **III. PROBLEMS WITH SNA 1993 TREATMENT OF UNFUNDED PENSION SCHEMES**

#### **A. Inconsistency of treatment of funded and unfunded pension schemes**

The current treatment of unfunded benefit pension schemes in the System, especially the different treatments accorded to funded and unfunded defined benefit pension schemes, raises both conceptual and consistency problems.

The different treatment accorded to funded versus unfunded pension schemes in the System is based on the view that the assets of such schemes should be attributed to the household sector. Conversely, if there are no assets no such attribution is possible. This approach appears to be consistent with the treatment in the System of reserves held by life insurance funds.

Perhaps this approach is defensible for defined contribution schemes, where the net present value of the benefits ultimately payable to the household sector is (approximately) equal to the value of the assets held by the pension fund. But in the case of defined benefit schemes the present value of the pension asset of the household sector depends on an actuarial assessment of future benefits the employer is obliged to provide, and is independent of the value of pension reserves. This is in fact recognized in the System itself in assessing the net worth of funded defined benefit pension schemes – “The liability of a defined benefit pension scheme is equal to the present value of the promised benefits”<sup>22</sup> and “the net worth of pension funds includes an amount that is positive or negative if the assets of defined benefit pension funds exceeds or falls short of the funds’ liabilities for guaranteed benefits”<sup>23</sup>. Similarly the treatment in the Other Changes in Assets Account in regard to “changes in the actuarially determined liability that result from changes in the benefit structure”<sup>24</sup> is consistent with an actuarial basis of valuation of the pension asset/liability, but inconsistent with valuation based on segregated funds.

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<sup>19</sup> This would require the employer to pay amounts into such a fund in each period sufficient to meet the increase in the net present value of the actuarially determined benefits accrued in the present period.

<sup>20</sup> I. e. the net present value of future benefits depend on various assumptions used in actuarial calculations, and changes to those assumptions can substantially affect the valuations.

<sup>21</sup> Notional defined contribution schemes.

<sup>22</sup> SNA 13.78

<sup>23</sup> SNA 13.83

<sup>24</sup> SNA 12.53

This gives rise to an inconsistency in the System because liabilities are recognized for funded defined benefit schemes but not for unfunded defined benefit schemes, despite the fact that the valuation of liabilities for all defined benefit schemes depends only on the expected benefits, and even for funded defined benefit schemes the liabilities can exceed the assets<sup>25</sup> of such a scheme by an arbitrary amount.

In any case, the household sector does not directly control the assets of funded pension schemes even for autonomous defined contribution schemes, and the claims by households are always on the entity controlling the scheme, which has the legal claim on the assets. This is reflected in the System in the sectoral classification of the balance sheet, where the household pension assets have a counterpart in the liabilities (insurance technical reserves) of the sector controlling the pension fund<sup>26</sup>. Thus, rather than households ‘owning’ the assets of funded pension schemes, it would be more accurate to say that the entity controlling the pension scheme owns the reserve assets, but has a corresponding liability to the household sector. In the case of defined contribution schemes, the value of the pension fund liability (and household asset) is determined by the reserve assets, but this is not true for defined benefit schemes, even if they are funded.

Logically there seems to be no need for an entity to have a particular class of assets for it to have a liability, and certainly such a restriction is not applied in the case of other liabilities, such as loan liabilities. Therefore the restriction of pension related assets and liabilities to funded schemes appears to be an anomaly in the System. Because defined benefit pension schemes are commonly unfunded, especially in the case of governments, the effect of the current treatment is to substantially under record the net asset position of the household sector and the liabilities of the employer sectors.

A general principle of the System is that similar economic events should be treated similarly<sup>27</sup>. Funded and unfunded pension schemes are similar in that both arise from contractual agreements between employers and employees, and are legally enforceable liabilities of the employers. The nature of the benefits, the eligibility criteria, and the valuation of the liability also do not depend on the means of funding.<sup>28</sup> Therefore, unless substantial economic consequences resulting from funding differences can be identified to justify the current difference in treatment, the stocks and flows shown in the System should be equivalent for both funded and unfunded pension schemes.

## **B. Reliability and measurement of unfunded pension liabilities**

SNA 1993 does not specify any reasons for the difference in treatment of funded and unfunded schemes aside from the assignment of reserve assets to the household sector, but it may also reflect:

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<sup>25</sup> The assets can also exceed the liabilities, but this is less common.

<sup>26</sup> If the household sector ‘owned’ the reserves their claim would be directly on the reserve assets, not on the entity holding those reserves.

<sup>27</sup> John Pitzer, The Treatment of Pension Schemes in Macroeconomic Statistics

<sup>28</sup> John Pitzer, The Treatment of Pension Schemes in Macroeconomic Statistics

- 1) some degree of uncertainty in the likelihood that unfunded employer pension obligations will eventually be met, and/or
- 2) perceived measurement problems.

As with any accounting system, the System should record assets and liabilities if and only if;

- a) It is probable that the future flow of resources represented by the assets/liabilities will eventually occur; and
- b) The assets/liabilities can be measured reliably.

Therefore one possible objection to the inclusion of unfunded pension scheme assets/liabilities in the balance sheet is that it is not probable that pensions which are not secured by segregated funds will in fact be paid.

Certainly the reliability of promises to pay pensions is increased if a pension scheme is funded and the funds are managed by an autonomous entity, because assets exist under separate trustee control and the funds can only be used to pay pension benefits. On the other hand unfunded schemes are integrated into the general activities of the employer, and therefore whether or not employees will eventually receive the promised benefits will depend on the long term viability of the employer<sup>29</sup>. However, this caveat applies with almost equal force to funded<sup>30</sup> non-autonomous schemes, because the separation of fund assets from other assets of the entity is essentially an administrative distinction.

In the case of governments, pension obligations (which, as noted above, are likely to comprise the bulk of unfunded scheme liabilities) are backed by the sovereign power of governments<sup>31</sup>, reflect on their economic credibility, and are likely to continue to be met in any circumstances short of economic breakdown.

In the case of corporations there is clearly a strong temptation to attempt to escape from unfunded or under-funded obligations, and this is sometimes done, as in the recent high-profile case of United Airlines. But this 'remedy' is a breach of contract which can only be contemplated if a corporation is bankrupt, which also affects other contracts that the corporation has entered into. Moreover, it has severe economic consequences for the household and corporate sectors (not to mention governments, which may have to pick up the pieces).

Furthermore, supposing that unfunded obligations are in fact dishonored, the current treatment in the System says in effect that, in an economic sense, nothing has happened, because unfunded pension obligations did not amount to household assets or employer liabilities. On the other hand if these assets and liabilities had been recognized in the System entries would appear in the Other

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<sup>29</sup> John Pitzer, *The Treatment of Pension Schemes in Macroeconomic Statistics*

<sup>30</sup> Especially if they are underfunded.

<sup>31</sup> In particular, their power to raise revenue through taxation.

Changes in the Volume of Assets Account, in the same way as the writing off of bad debts.<sup>32</sup> Given that the System is intended to record all economic activity in an economy – “the stocks and flows are exhaustive within the boundaries defined”<sup>33</sup> – this approach would appear to be superior because changes in the economic position of the household and employer sectors, which have actually occurred, can be observed.

In any event, the treatment in the System of imputed contributions to unfunded pension schemes as part of compensation of employees indicates that the projected benefits are seen as embodying real economic value.

The rights conferred by unfunded pension schemes do not seem to be fundamentally different in their economic effects from funded schemes (especially funded defined benefit schemes). Furthermore, the exclusion of the assets and liabilities relating to unfunded pension schemes from the sectoral balance sheets seems to substantially detract from the objective of balance sheets in the System: “Balance sheets provide information necessary for analyzing a number of topics. For example, in studies of the factors determining household behaviour, consumption and saving functions have often included wealth variables . . .”<sup>34</sup> – a wealth measure for the household sector that does not include unfunded pension entitlements is missing an important component. Similarly, “For corporations, balance sheets permit the computation of widely used ratios . . . for instance, current assets in relation to current liabilities”<sup>35</sup> – the unfunded pension obligations of corporations are surely an essential component of any comprehensive measure of corporate liabilities.

Therefore concern over the reliability of unfunded pension promises does not seem to justify ignoring the obligations of employers, and the rights of their employees, in drawing up the national balance sheet and related economic flows.

However another objection which could be brought forward to recognition of unfunded pension obligations in the System is that they are difficult to measure.

Unfunded pension schemes are nearly always defined benefit schemes.<sup>36</sup> As noted above, the valuation of defined benefit pension schemes requires the use of actuarial calculations to determine the probable cost of future benefits promised by the schemes. The methods which could be used for valuation of defined benefit pension schemes are discussed later in this paper, but as stated above there is a general criteria for assets/liabilities to be able to be reliably measured for inclusion in accounting systems. In this regard it is worth noting that while such employer liabilities (and therefore household assets) may not in fact be estimated by the

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<sup>32</sup> SNA 12.51

<sup>33</sup> SNA 3.2

<sup>34</sup> SNA 13.4

<sup>35</sup> SNA 13.5

<sup>36</sup> The exceptions, as previously noted, are notional defined contribution schemes, which are presently rare.

employer in some cases, it is certainly possible for them to be reliably estimated in principle, because this is done in the case of numerous corporations and at least some governments. Also, there is now a world wide movement towards adopting accrual accounting for governments, which will entail the measurement of these liabilities. Therefore problems in estimating these assets/liabilities in specific cases should not be put forward as a reason for not recognizing them in general.

### **C. Consistency of SNA 1993 with other accounting systems**

The treatment in the System of unfunded pension schemes is inconsistent with the treatment of such schemes both in the GFSM 2001 system, and in international accounting standards.

While GFSM 2001 differs from SNA 1993 in regard to the way in which information is classified and presented, generally the stocks and flows are defined in the same way, and with the same timing, to ensure as far as possible consistency in macroeconomic statistics. The most important difference between the two systems is in regard to unfunded pension systems. GFSM 2001 treats unfunded pension schemes similarly to funded schemes, recognizing employer<sup>37</sup> liabilities equal to the net present value of promises to provide pension benefits in future, in respect of employee services which have been provided to the present. The adoption of a divergent treatment of employer pension schemes in GFSM 2001 reflects the importance of unfunded pension schemes in the public sector, and the view that balance sheets for governments would therefore be seriously deficient if liabilities associated with unfunded pension obligations were not included. GFSM 2001 also classifies all the increase in the pension liability due to the passage of time, for both funded and unfunded pension schemes, as property income (*property expense attributed to insurance policyholders*), while SNA 1993 classifies only the investment income on invested funds as property income, and the remainder of the change in the liability of funded schemes as holding gains or losses.

Similarly, International Accounting Standard (IAS) No 19, Employee Benefits, requires that enterprises recognize:

- a) a liability when an employee has provided service in exchange for employee benefits to be paid in future; and
  - b) an expense when the enterprise consumes economic benefits in exchange for employee benefits.
- irrespective of whether they involve the creation of a separate entity to receive contributions and pay benefits.

IAS 19 does not apply to general government units, which are covered by International Public Sector Accounting Standards (IPSAS). An IPSAS specifically covering employee benefits has not yet been created, but IPSAS is closely based on IAS<sup>38</sup> and it is probable that

<sup>37</sup> General government as an employer, and public corporations.

<sup>38</sup> For governments that adopt accrual accounting; an IPSAS standard is also provided for governments using a cash accounting basis.

when an IPSAS standard on employee benefits is released it will adopt the same approach as IAS 19. In the meantime IPSAS 19<sup>39</sup>, which covers provisions generally – including provisions for pensions and other employee benefits – requires that a provision (i. e. a liability of uncertain timing or amount) be recorded when:

- (a) An entity has a present obligation as a result of a past event;
- (b) It is probable that an outflow of resources will be required to settle the obligation;
- (c) A reliable estimate can be made of the amount of the obligation.

– which clearly indicates that defined benefit scheme obligations should be included as provisions, regardless of whether any pension fund assets are also held.

The design and structure of SNA 1993 draws heavily on business accounting practices, and departs from them only where they conflict with economic theory.<sup>40</sup> In this case there is no obvious incompatibility between the international accounting standards and economic theory; indeed the accounting standards appear to adopt a full accrual treatment of unfunded pension schemes, while SNA 1993 currently adopts what is in effect a cash based treatment<sup>41</sup>, which is not consistent with the preferred timing basis used elsewhere in the System.

#### **IV. PROPOSED REVISIONS TO SNA 1993 TREATMENT OF DEFINED BENEFIT PENSION SCHEMES**

For the above reasons, a liability equal to the present value of promised pension benefits – and the corresponding economic flows – due to services provided by employees to the present date, should be included for both funded and unfunded defined benefit pension schemes in the accounts for institutional sectors in SNA 1993.

Although SNA 1993 does not at present include these stock and flow items in the main sequence of accounts, it does recommend that a memorandum item should be noted for households and employers on their balance sheets.<sup>42</sup> However, this recommendation is not sufficient for the following reasons:

- 1) Use of a memorandum item indicates that unfunded pension liabilities are different in kind from funded pension liabilities (i. e. do not fit the concept of liabilities within the System), which as shown above is not justified;

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<sup>39</sup> [www.ifac.org/PublicSector/](http://www.ifac.org/PublicSector/)

<sup>40</sup> SNA 1993 1.59

<sup>41</sup> I. e. no liability is recorded, and the net result of the two distribution of income accounts is to show an outflow of resources from the employer to the employees equal to the cash pension payments.

<sup>42</sup> SNA 13.88

- 2) Use of memorandum items would result in some (i. e. funded) defined benefit pension schemes being included in the main system, while other (unfunded) schemes are excluded, even though the economic effects of the schemes is essentially the same. This is true even where funded schemes have non-autonomous segregated funds which are substantially less than their liabilities.
- 3) Memorandum items are allowed in SNA 1993 for more specialized analytical purposes, i. e. for analysis which goes beyond the normal use of national accounting data. Therefore exclusion of the unfunded pension liabilities from the balance sheet proper means that important information is not automatically included<sup>43</sup> in the basic macroeconomic information used for planning and monitoring economic policy;
- 4) Use of memorandum balance sheet items does not result in recording of the economic flows associated with the creation and extinguishment of these liabilities.

Similarly, a satellite account approach is also not appropriate to accommodate unfunded pension schemes. Such accounts are appropriate where there is not sufficient flexibility in the System to accommodate conflicting approaches<sup>44</sup>, or where there a need to expand the analytical capacity of national accounting.<sup>45</sup> This is not the situation in regard to unfunded pension schemes.

The inclusion of all defined benefit schemes in SNA 1993, and consistent treatment between funded and unfunded schemes, will require changes to the stock and flow items described below. Changes will be required for both funded and unfunded defined benefit schemes, except that autonomous defined benefit schemes would be expected to already be funded on a full actuarial basis, and should not require any changes.

- 1) No changes are likely to be required to the Production Account. The System recommends that the costs associated with the provision of insurance services by the non-autonomous pension schemes be treated as ancillary to the main activity of the employer and included with that activity<sup>46</sup>.

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<sup>43</sup> Of course users could also add these memorandum items to the balance sheets for analytical use. But this begs the question as to why they are not there in the first place.

<sup>44</sup> SNA 1993 21.2

<sup>45</sup> SNA 1993 21.4

<sup>46</sup> SNA 1993 Annex IV paragraph 20

- 2) The principle outlined for the recording of accruing benefits to unfunded pensions schemes – employer’s imputed social contributions (D 122), payable by the employer sectors in the Generation of Income Account<sup>47</sup> and receivable by the household sector in the Allocation of Primary Income Account – remains valid. However, for consistency, funded (but non-autonomous) defined benefit pension schemes should be treated in the same way as unfunded schemes. This would require that imputed contributions be included to make up the difference (which could be either positive or negative) between the actual contributions and the amount that would be required to meet entitlements to pension benefits accrued in the period<sup>48</sup>. Also, SNA 1993 currently suggests that benefits paid can be used as a proxy for imputed contributions.<sup>49</sup> However, such a measure is unlikely to be a satisfactory proxy, and efforts should be made to obtain actuarially based estimates of imputed contributions<sup>50</sup>. [see Appendix Table 7.1]<sup>51</sup>
- 3) Amounts receivable by the household sector, and payable by the sector of the employer, have to be added to the Allocation of Primary Income Account for all non-autonomous<sup>52</sup> defined benefit schemes to record the increase in the value of the pension assets/liabilities due to the passage of time. This increase occurs from one accounting period to the next because the present value of the benefits payable<sup>53</sup> is calculated using one fewer discounting period. The increase is not a revaluation because it does not result from price changes. In the case of non-autonomous funded defined benefit schemes the property income attributed to insurance policyholders calculated as described above replaces the calculation based on investment income.<sup>54</sup> [see Appendix Table 7.2]
- 4) An amount payable by the household sector and receivable by the employer sectors should be added to the Secondary Distribution of Income Account to record the return

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<sup>47</sup> SNA 1993 7.45

<sup>48</sup> Of course such additional imputed contributions would only need to be included where they were material.

<sup>49</sup> SNA 1993, 7.46

<sup>50</sup> See discussion in section V of this paper.

<sup>51</sup> The valuation of imputed contributions where the employer does not carry out its own actuarial calculations is discussed later in this paper.

<sup>52</sup> The principle is of course the same for all defined benefit schemes, including autonomous schemes, but one would expect that the investment flows for autonomous schemes would approximately match (and provide a satisfactory proxy) for the actuarially determined increase in liability.

<sup>53</sup> The future stream of economic outflows resulting from current obligations, discounted to present values.

<sup>54</sup> This is because, as noted earlier, the pension liability is not dependent on the value of the reserve assets and it follows that the increase in the pension liability is also independent of the income received on investment of the reserve. Investment income from pension schemes reserves (if any) is income of the sector controlling the scheme.



to the employer sectors of supplementary employee contributions – the imputed D.44 *property income attributed to insurance policy holders* in the Allocation of Primary Income as described above. A new item D.6122 *Employee's imputed pension contributions* needs to be created to accommodate this imputed flow. This flow corresponds to D.6112 *Employees' social contributions* of defined contribution pension schemes, and replaces the measure based on investment income for non-autonomous funded defined benefit schemes. Also, the adjustment to D.122 *Employer's imputed pension contributions* in the Primary Income Accounts has to be carried through to the equivalent item (D.6121) in the Secondary Distribution of Income Account. [see Appendix Table 8.1]

- 5) The item D.8 *adjustment for the change in net equity of households in pension funds* in the Use of Disposable Income Account needs to be modified to reflect changes in the Secondary Distribution of Income Account for defined benefit pension schemes. This item should record receivables by the household sector and payables by the employer sectors equal to the (actual and imputed) employer contributions plus employee contributions plus imputed supplementary employee contributions<sup>55</sup> to defined benefit schemes – as defined above – less benefits payable during the period. [see Appendix Table 9.1]
- 6) A change to item F.612 *Net equity of households in pension funds* to reflect the acquisition of financial assets for the household sector and corresponding incurrence of liabilities for the employer sectors in the Financial Account resulting from the recognition of liabilities for unfunded pension schemes, and changed calculation of *Property income attributed to insurance policyholders* for defined benefit pension schemes. The value of item F.612 for defined benefit schemes should be the increase in the net present value of the obligations to provide pension benefits in future due to the service provided by employees during the accounting period plus imputed property income attributed to insurance policyholders less the pension benefits payable during the accounting period. [see Appendix Table 11.1]
- 7) Changes to the value of pension obligations of defined benefit schemes can also occur due to changes in prices affecting the schemes, and changes to the schemes structure. Valuation changes to the prices affecting defined benefit schemes, notably the interest rates used in discounting future benefits, should be recorded in item AF.6 *Insurance technical reserves* in the Revaluation Account. Valuation changes resulting from alterations to the structure of the schemes, such as increases in benefits, or changes to eligibility conditions, should be recorded in item AF.6 in the Other Changes to the Volume of Assets Account. [see Appendix Tables 12.1 and 12.2]
- 8) Changes to item F.6 *Insurance technical reserves* relating to defined benefit pension schemes to reflect the valuation of the employer liability/household asset in relation to defined benefit pension schemes as the present value of the obligation to provide future pension benefits due to service which has been provided to the balance date.

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<sup>55</sup> I. e. increase in the value of pension obligations due to the passage of time.

Reserve assets (if any) should be classified as assets of the employer sector. [see Appendix Table 13.1]

## **V. ESTIMATION OF DEFINED BENEFIT PENSION LIABILITIES AND CONTRIBUTIONS**

### **A. Estimation of defined pension liabilities**

By their nature, non-autonomous defined benefit pension schemes are likely to be restricted to large corporations and governments, because as noted above the credibility of such schemes depends on the long term viability of the employer.

In the case of large corporations it is probable that recording will be on an accrual basis, and therefore the present value of the liability due to future pension obligations will be recorded on the balance sheet. Many governments remain on a cash basis of recording, and in this case all that will be recorded in accounting documents are the cash flows associated with pension contributions (if any) and benefit payments.

The SNA notes that the values that should be imputed for the contributions to unfunded defined benefit schemes “ought, in principle, to be based on the same kind of actuarial considerations that determine the levels of premiums charged by insurance enterprises”.<sup>56</sup>

In fact, as described above, the value of the pension liability, as well as the contributions to the scheme, should be based on actuarial considerations for all defined benefit schemes, irrespective of whether they are funded or unfunded.

While the actual contributions, and accumulated assets, of funded defined benefit schemes may provide acceptable proxy measures of the accrual stock and flow values, compilers should satisfy themselves that such measures are used only where the pension scheme is fully funded. This is particularly the case for governments, where the funding of pension schemes is at the discretion of the government, and may suffer because of fiscal constraints. In any event, where separate pension funds exist actuarial calculations are required to determine the levels of assets and contributions required to fund the scheme (even if in the event it is not adequately funded) and the required information should be sought from the fund management.

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<sup>56</sup> SNA 1993 7.45

Even where an accrual accounting system is used not all the flows relating to pension obligations will necessarily be reported, because accounting standards do not generally distinguish flows according to their economic character. Therefore a single flow may be recorded<sup>57</sup>, representing the change in the pension liability during the current accounting period. In addition, an asset representing pension fund reserves<sup>58</sup> and flow showing associated investment income would be recorded. As noted above, the change in the pension liability in any period is caused by a number of different economic flows, viz:

- Employer contributions for service provided in the period – *employer imputed social contributions* (part of compensation of employees);
- Property income flow representing the expense associated with a reduction in the length of time that the liability is discounted to the present value – *property expense attributed to insurance policyholders*;
- A reduction in the liability due to pension benefits payable in the current period;
- Changes to the liability (which can be either positive or negative) resulting from changes to the structure of the scheme or to assumptions underlying the actuarial calculations of the pension liability.

Therefore it may be necessary to dissect a single accounting flow into its economic components, which will require additional information to be obtained from the employer.<sup>59</sup>

The SNA also suggests that where estimates on an actuarial basis are not available “the only practicable alternative may be to use the unfunded social benefits payable by the enterprise during the same accounting period as an estimate of the imputed remuneration that would be needed to cover the imputed contributions.” The SNA notes, however, that there are 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.<sup>60</sup> Indeed, the nature of pension schemes is such that social benefits payable are unlikely to be a good proxy for the appropriate accrual measures. This is because there is very long time lag (up to two generations) between the date that employees commence work, which is when entitlement to pension benefits begins to accrue, and when they retire, which is when the benefits begin to be paid. The typical time series of accruing obligations would show a gradual increase or decrease over time in line with the increase or decrease in the work force. On the other hand, benefits payable are initially very low but increase rapidly when the original employees begin to retire. Thus the time series of accruing obligations and actual benefit payments have quite different shapes, with the payment series

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<sup>57</sup> If employee contributions are deducted they would be shown separately as a component of wages and salaries.

<sup>58</sup> As noted above the liability for defined pension obligations is independent of pension fund assets, but legal requirements will normally ensure that corporation employer schemes are at least partially funded.

<sup>59</sup> The required information should be readily available because it would be needed to build up the aggregate values.

<sup>60</sup> SNA 1993, 7.46

initially much lower than the accruing obligations, but eventually exceeding them, perhaps substantially. The point at which this cross-over occurs depends on (amongst other things) the ratio of employed to retired staff. Therefore, for the benefit payments to approximately match the accruing obligations would require a particular correlation between the number of current and retired employees which would be unusual, and which would normally not persist for any length of time. For these reasons the cash benefit payments (and also benefits payable series) do not provide a good basis for estimating the imputed pension contributions, and better measures should be sought.

Initially more detailed (and preferably accrual based) data should be sought from the employer – specifically staff involved in managing the pension scheme. Even if only cash data are published more complete data are likely to be available for internal management purposes.

If it is not possible to obtain professional actuarial estimates of the stocks and flows relating to pension obligations, it may still be possible to derive more approximate actuarial estimates using the following approach. Of course any actuarial calculations require the active cooperation of the employer, because defined benefit scheme obligations are dependent on each employee's employment history.

As noted above, the benefits associated with such schemes are defined by some sort of formula, which can vary widely but typically involve such things as length of employment and wages and salaries.<sup>61</sup> The case considered here is where retirement is at a specified age, and retirement benefits are determined by the employee's length of service, and final salary. Obviously while the case is intended to provide a general approach to estimating defined benefit pension liabilities, it would have to be adapted to the specific situation applying for each employer. The steps involved in developing approximate actuarial estimates of pension obligations are as follows:

- 1) Current and retired employees are divided into groups (cohorts) of the same age. This step would have to be carried out by the employer.
- 2) For each cohort the present 'starting values' of a series of annual pension benefits to which current and former employees will be entitled are calculated. For retired employees actual annual benefits payable are used as the 'starting values'.
- 3) For current employees, their employment history data (in this case, length of service, and current wage or salary) are used to generate inputs to be fed into the formula used to calculate expected annual benefits at retirement age. If the current wage or salary is used in the calculation the expected benefits are likely to be under estimated because real wages and salaries tend to increase over an employees' working life. Therefore an attempt should be made to project wages and salaries to retirement date. The projection would use the expected rate of increase in wages and salaries from the present to retirement date – allowing for both general wage increases, and increases due to promotion. This can be determined by examining historical data. The

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<sup>61</sup> Perhaps final wage/salary, or average wage/salary over some period.

calculated benefit values then have to be discounted to their present value.<sup>62</sup> If this is done by the employer, each such calculation should be done for an individual employee; but if it is done by external compilers this would not be feasible and the calculations would have to use averages of employee current wages and salaries.

- 4) These values are multiplied by the ratio of persons surviving at retirement age compared with persons at current age (for each cohort)<sup>63</sup> to reflect the fact that not all currently employed persons will survive to retirement age.
- 5) The result is a series of same-age cohorts each with the approximate expected annual present value pension entitlements at retirement age (for current employees) or actual age (for retired employees) due to service provided to the present.
- 6) The employer's liability in respect of each age cohort is then obtained by summing the present value of annual benefits expected to be provided from the age of retirement (for current employees) or actual age (for retired employees) until the death of all members of the cohort, and their surviving beneficiaries. This is an iterative process, with the expected value of pension benefits at age  $n + 1$  being obtained from the expected benefits for age  $n$  by :
  - a) applying an increase in the nominal value of the benefits according to the pension benefits formula (i.e. increasing benefits by the consumer price index, or other index as specified), and then discounting to present value<sup>64</sup>; and
  - b) multiplying the result by a factor representing the expected survival of beneficiaries from age  $n$  to age  $n + 1$ . This factor is difficult to obtain, because while life tables can be used to determine the expected survival ratio of retirees from age  $n$  to age  $n + 1$ , retirement benefit schemes usually also provide benefits to survivors of deceased employees, and therefore provision of benefits<sup>65</sup> can extend substantially beyond the death of a retiree. Therefore the beneficiary survival ratio from age  $n$  to age  $n + 1$  derived using life expectancy tables should be adjusted by applying an expansion factor equal to the ratio of actual pension benefits provided to age cohort  $n + 1$  divided by the benefits provided to age cohort  $n$  for the most recent year, multiplied by the ratio of surviving retirees at age  $n$  over surviving retirees at age  $n + 1$  (using employer data on benefits paid and number of surviving retirees for the respective age groups).<sup>66</sup> This ratio gives

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<sup>62</sup> I. e. The amount that would have to be invested at current interest rates (e. g. long term bond rates) to equal the benefit value.

<sup>63</sup> Using life expectancy tables.

<sup>64</sup> This involves assumptions about inflation and interest rate trends.

<sup>65</sup> Usually at a reduced rate.

<sup>66</sup> Such expansion factors would not have to be recalculated every year.

an indicator of the extent to which benefits payable to a retiree's dependents persist beyond the survival of the retiree for each age cohort.

- c) This process is repeated until the expected value of benefits for age  $n + I$  is zero (or at least immaterial).
- 7) The employer's total liability for pension benefits is then obtained by summing the total liability for all age cohorts.

## **B. Estimation of defined benefit economic flows**

In the absence of changes to the pension scheme, the difference between the present value (*PV*) of employer liabilities calculated as described above at the end of one period (*PV<sub>p</sub>*) compared with the equivalent calculation at the end of the previous period (*PV<sub>p-1</sub>*) represents the increase in pension liabilities due to service provided during period *p* (*employer imputed social contributions*) plus the increase in the liability due to the reduction of one period in discounting future benefits to present value (*property expense attributed to insurance policyholders*) less pension benefits payable in period *p*.

- 1) The value of *property expense attributed to insurance policyholders* in period *p* can be estimated by applying an appropriate interest rate<sup>67</sup> to the present value of the liability at the beginning of the accounting period (*PV<sub>p-1</sub>*).
- 2) The *employer imputed social contributions* can then be obtained as a residual by subtracting property expense attributed to insurance policyholders from the change in the pension liabilities, and adding pension benefits payable<sup>68</sup>.
- 3) If changes are made to the structure of the pension scheme (level of benefits, qualifying criteria etc), then the resulting changes in the value of the pension liability are classified as other changes in the volume of assets. Similarly, changes to the prices (mainly discount rates) used in calculating benefits give rise to holding gains or losses. These changes can be calculated by subtracting the total expected benefits payable calculated on the old basis from the values calculated on the new basis.

The above process would provide approximate actuarial estimates for all the stock and flow items required for the SNA 1993 (and GFSM 2001).

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<sup>67</sup> The appropriate interest rate is the rate that has been used in the actuarial calculations to discount future cash flows to present value. If this is not readily available, a proxy interest rate, such as the long term government bond rate could be used.

<sup>68</sup> Where only cash data on benefits payable are available these can be used as a proxy for benefits payable provided they are adjusted for changes in arrears.

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**Appendix**

**Table 7.2    Account II.1.2    Allocation of Primary Income Account**

Uses						Resources						
Total eco- nomy	NPISHs	House- holds	General govern- ment	Finan- cial corpo- rations	Non- finan- cial corpo- rations	Transactions	Non- finan- cial corpo- rations	Finan- cial corpo- rations	General govern- ment	House- holds	NPISHs	Total eco- nomy
						D.1 Compensation of employees <i>Defined benefit scheme adjustments</i>				766 6		766 6
						D.12 Employers' social contributions <i>Defined benefit scheme adjustments</i>				193 6		193 6
						D.122 Employers' imputed contributions <i>Defined benefit scheme adjustments - consequent to changes in the Generation of Income Account</i>				19 6		19 6
391 12	6	41	42 8	167	135 4	D.4 Property Income <i>Defined benefit scheme adjustments</i>	86	141	32	150 12	7	416 12
25 12				25	4	D.44 Property Income attributed to insurance policyholders <i>Defined benefit scheme adjustments - due to the imputation of property income attributed to insurance policyholders for all non-autonomous defined benefit pension schemes due to the passage of time</i>	5	0	0	20 12	0	25 12

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**Appendix**

**Table 13.1      Account IV      Balance Sheets**

**Assets**

**Liabilities and Net Worth**

Accounts	Total eco- nomy	NPISHs	House- holds	General govern- ment	Finan- cial corpo- rations	Non- finan- cial corpo- rations	Stocks, transactions and other flows	Non- finan- cial corpo- rations	Finan- cial corpo- rations	General govern- ment	House- holds	NPISHs	Total eco- nomy
IV.1 Opening balance sheet	370	4	291	20	30	25	F.6 Insurance technical reserves	12	335	19		5	371
	150		150				<i>Defined benefit scheme adjustments - to change pension liabilities for defined benefit pension schemes to the present value of the obligations to provide future pension benefits due to service which has been provided to the balance date</i>	48		101		1	150
IV.2 Changes in balance sheet	38		38				F.6 Insurance technical reserves		38				38
	19		19				<i>Defined benefit scheme adjustments - as described above</i>	6		13			19
IV.3 Closing balance sheet	408	4	329	20	30	25	F.6 Insurance technical reserves	12	373	19		5	409
	169		169				<i>Defined benefit scheme adjustments - as described above</i>	54		114		1	169



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**Appendix**

**Table 11.1    Account III.2    Financial Account**

**Changes in Assets**

**Changes in Liabilities and Net Worth**

Total eco- nomy	NPISHs	House- holds	General govern- ment	Finan- cial corpo- rations	Non- finan- cial corpo- rations	Transactions	Non- finan- cial corpo- rations	Finan- cial corpo- rations	General govern- ment	House- holds	NPISHs	Total eco- nomy
36		36				F.6 Insurance technical reserves		36				36
18		18				<i>Defined benefit scheme adjustments</i>	6		12			18
22		22				F.61 Net equity of households in life insurance funds and in pesion funds		22				22
18		18				<i>Defined benefit scheme adjustments</i>	6		12			18
11		11				F.612 Net equity of households in pension funds		11				11
18		18				<i>Defined benefit scheme adjustments - resulting from the recognition of liabilities for unfunded pension schemes, and changed calculation of property income attributed to insurance policyholders</i>	6		12			18

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**Appendix**

**Table 7.1    Account II.1.1    Generation of Income Account**

<b>Uses</b>							<b>Resources</b>					
Total eco- nomy	NPISHs	House- holds	General govern- ment	Finan- cial corpo- rations	Non- finan- cial corpo- rations	Transactions	Non- finan- cial corpo- rations	Finan- cial corpo- rations	General govern- ment	House- holds	NPISHs	Total eco- nomy
762 6	23	39	140 4	15	545 2	D.1 Compensation of employees <i>Defined benefit scheme adjustments</i>						
193 6	11	0	53 4	5	124 2	D.12 Employer's social contributions <i>Defined benefit scheme adjustments</i>						
19 6	1	0	5 4	1	12 2	D.122 Employer's imputed contributions <i>Defined benefit scheme adjustments - due to imputation to make up the difference between actual contributions and the amount that would be necessary to meet entitlements to pensions accrued during the period plus use of actuarial estimates rather than benefits paid for imputed contributions</i>						

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**Appendix**

**Table 12.2    Account III.3.2    Revaluation Account**

Changes in Assets						Changes in Liabilities and Net Worth						
Total eco- nomy	NPISHs	House- holds	General govern- ment	Finan- cial corpo- rations	Non- finan- cial corpo- rations	Transactions	Non- finan- cial corpo- rations	Finan- cial corpo- rations	General govern- ment	House- holds	NPISHs	Total eco- nomy
-7		-6			-1	AF.6 Insurance technical reserves		-7				-7
2		2				<i>Defined benefit scheme adjustments - due to changes to prices affecting actuarial calculations for defined benefit schemes</i>	1		1			2

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**Appendix**

**Table 8.1    Account II.2    Secondary Distribution of Income Account**

Uses						Resources						
Total eco- nomy	NPISHs	House- holds	General govern- ment	Finan- cial corpo- rations	Non- finan- cial corpo- rations	Transactions	Non- finan- cial corpo- rations	Finan- cial corpo- rations	General govern- ment	House- holds	NPISHs	Total eco- nomy
322		322				D.61 Social contributions	14	39	268		1	322
18		18				Defined benefit scheme adjustments	6		12			18
97		97				D.6112 Employees' social contributions	1	20	76			97
-3		-3				Defined benefit scheme adjustments - replacement of investment income of non-autonomous defined benefit funds by imputed values of property income attributed to insurance policyholders	-1		-2			-3
19		19				D.612 Imputed social contributions	12	1	5		1	19
21		21				Defined benefit scheme adjustments	7		14			21
19		19				D.6121 Employers' imputed pension contributions	12	1	5		1	19
6		6				Defined benefit scheme adjustments - return to employer sectors of adjustments to imputed employer contributions for non-autonomous defined benefit pension schemes	2		4			6
15		15				D.6122 Employees' imputed pension contributions	5		10			15
						Defined benefit scheme adjustments - return to employer sectors of imputed property income attributed to insurance policyholders for non-autonomous defined benefit schemes						

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## Appendix

**Table 9.1    Account II.4.1    Use of Disposable Income Account**

Uses						Resources						
Total eco- nomy	NPISHs	House- holds	General govern- ment	Finan- cial corpo- rations	Non- finan- cial corpo- rations	Transactions	Non- finan- cial corpo- rations	Finan- cial corpo- rations	General govern- ment	House- holds	NPISHs	Total eco- nomy
11					11	D.8 Adjustment for the change in net equity of households in pension funds				11		11
18				12	6	<i>Defined benefit scheme adjustments - to reflect chnganges made in the Secondary Distribution of Income Account</i>				18		18