

Decomposition of technical reserves of pension funds in price and volume changes; an application for the Netherlands

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Abstract

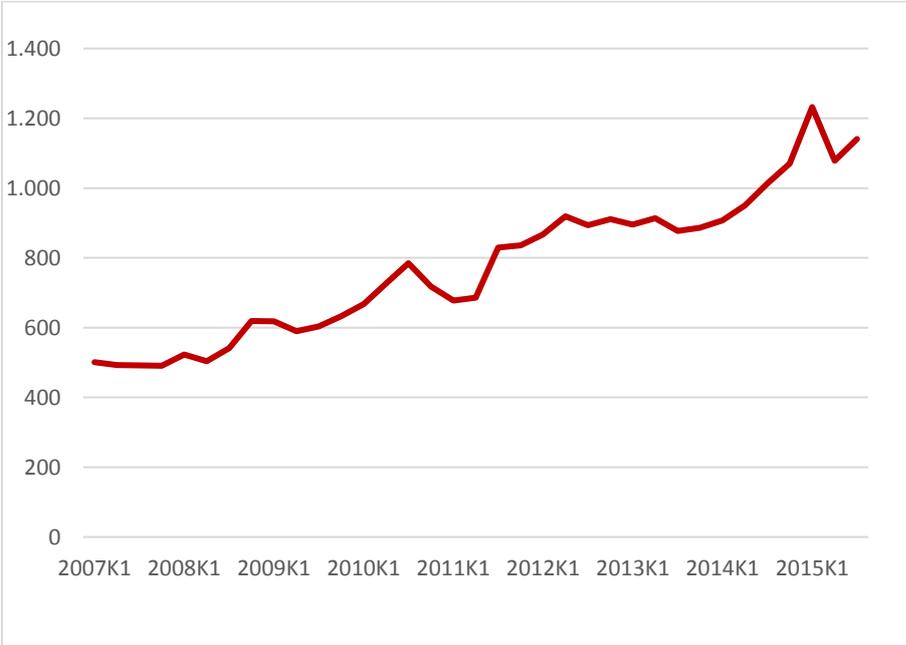
According to ESA2010 transactions of technical reserves of pension funds have to be distinguished. Moreover, users find it analytically helpful to identify price changes and other changes embodied in the development of pension obligations. This measurement issue is also a topic in the current making of a new data collection within the European system of Central Banks. In the Netherlands where the central bank is not only a co-complier of pension fund statistics but also a supervisor of pension funds, experience has been gained in analysing developments in pension funds' technical reserves. The paper will outline this approach and highlights the role played by revaluations.

¹ Opinions in this paper do not reflect automatically those of DNB. The author thanks colleagues for their helpful comments and is responsible for remaining errors and omissions.

1. Introduction

Insurance technical reserves have attracted much attention recently. It is at the heart of pension fund management and forms the basis of current and future benefits of millions of people. As technical reserves² have been rising during the last years in the Netherlands (Chart 1), one may wonder which factors might explain this growth. Usually, macroeconomic statistics not only measure these reserves, but also shed light on the nature of these reserves’ changes into price and volume components. From an analytical view, it is interesting to know whether changes in price or in volume, such as transactions, are responsible for major changes in the liabilities of pension funds. Statistics manuals SNA and ESA provide here guidance how to distinguish these changes. The purpose of this paper is to find out whether statistical guidance with respect to the volume-price breakdown can be applied to the real world of pension funds. To this end, the relation between pension fund entitlements’ accounting and the treatment in macroeconomic statistics will be scrutinised. Section 2 will start with prescriptions of ESA 2010 on this matter. The focus of section 3 will be practical, as we will show how Dutch pension funds report their technical reserves. In addition, we will see how the development of those reserves over time would fit in the volume-price breakdown. Section 4 concludes.

Chart 1 Technical provisions of Dutch pension funds, EUR billion

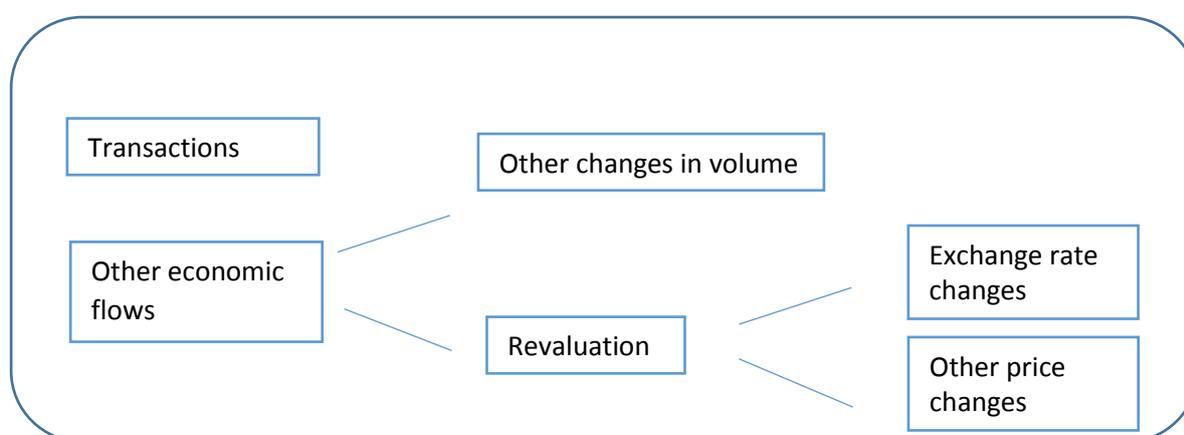


² Technical reserves or provisions, pension obligations and pension entitlements are used interchangeably in this paper.

2. What does ESA say about the volume-price breakdown in pension funds' technical reserves?

One of the accounting principles of ESA is the distinction between flows and stocks. Flows refer to actions that take place during a time period, stocks are positions at one point in time. Flows involve changes in the nature of an institutional units' assets or liabilities, and comes in two kinds: transactions and other changes in assets. In a transaction, units interact by mutual agreement.³ For example, in financial transactions units acquire or dispose of financial assets, e.g. households buy 100 shares of Heineken nv. Or banks issue liabilities like medium term notes. Besides transactions, *other* changes in assets can occur. They can be Other changes in volume of assets and liabilities or can be Holding (capital) gains and losses. Examples of these are depreciation of assets and reclassification of a unit from one sector to another (both are other changes in volume) and rising bond prices (capital gains). Holding gains and losses, or, to use another term, Revaluations, can also occur because of exchange rate changes. For example a stronger US dollar has an impact on North American assets held by foreigners. Revaluations are also there when prices of assets and liabilities change. ESA requires that all these changes in stocks can be fully explained by recorded flows (ESA 1.87). Figure 1 summarises this typology.

Figure 1 Economic flows in macroeconomic statistics



How can this general scheme be applied to pension entitlements? In economics these are the present value of all future income benefits of pension fund' beneficiaries. Let us first focus on

- Transactions

In ESA2010 pension entitlements are defined as financial claims that current employees and former employees hold against either

- a. Their employer
- b. A scheme created by the employer to pay pensions as a part of a compensation agreement
- c. An insurer (ESA 5.180).

³ Or an action within an institutional unit that is useful to treat as a transaction (ESA 1.66).

And § 5.181 adds by defining that transactions in pension entitlements consist of additions less reductions.

Additions are:

- (i) Actual contributions to pension schemes payable by employers and by employees on behalf of households with claims on the scheme. These contributions should be earned in the current accounting period;
- (ii) Supplementary contributions⁴ equal to the income earned from the investment of pension entitlements, and attributed to participating households;
- (iii) Employers' imputed pension contributions;
- (iv) Service charges to be deducted during the accounting period.

Ad (ii) represents the property income that is attributed to households in macroeconomic statistics. The reason is that income from investments is earned in the interest of beneficiaries, as they are assumed to receive property income from it. This income is then treated as contribution supplements payable by them.⁵ Further, households fictively reinvest this money back into the pension fund. Investment income increases the pension entitlements and can be seen as an addition coming from 'past service' i.e. it emerges during the course of the period due to the unwinding of the discount factor as retirement is one year closer (ESA 17.116).

Ad (iii) arises when employers' actual contributions do not meet the actuarial contributions necessary to match the increase in pension entitlements coming from current service. In that case the pension fund has a claim on the sponsor according to ESA.⁶

Reductions consist of:

- (v) Social benefits in the form of regular payments, equal to amounts payable to retired persons (or their dependants);
- (vi) Social benefits consisting of any lump sums payable to persons when they retire.

Elsewhere in ESA the Supplementary Table on Pension (SToP) is elaborated. This table gives a overview of all pension entitlements in social insurance; that is all claims of employees (work related pensions) and also capitalised pensions due to government unfunded social security (PAYGO

⁴ ESA calls these contribution supplements or D.614 (ESA 4.101).

⁵ This is an assumption, and the attributed property income does not need to coincide with the actual income the pension fund receives in the form of interest, dividend and rent.

⁶ The pension entitlements category does not include contingent pension entitlements established by institutional units classified as unfunded government defined benefit employer pension schemes or as social security pension funds. Their transactions are not fully recorded and their other flows and stocks are not recorded in the core accounts, but in the supplementary table on accrued-to-date pension entitlements in social insurance (ESA 5.184).

systems). The SToP table adds to the calculation of entitlements two additional sources of transactions:

- (vii) Transfers of pension entitlements between schemes
- (viii) Change in pension entitlements as a result of negotiated changes in the schemes.

In sum, according to ESA the transactions above will change pension entitlements during the accounting period.

-Other changes in volume: pension entitlements vary also because of to changes in demographic assumptions, that works through into updates of mortality tables. This is a change in the value of assets and liabilities, not resulting from transactions (ESA 6.14).

-Revaluations: pension liabilities can change too because of increase or decrease in its price. As pension entitlements are the present value of the discounted future benefits of participants to a DB pension scheme, changes in the interest rate, or movements in an entire yield curve of interest rates, is the driving force for revaluations.

It is important to stress that the amounts recorded for pension entitlements depend on the type of the pension scheme. In a DB scheme, ESA outlines all the elements above. In a DC scheme, the liability of the pension fund towards its participants is the current market value of the funds' assets. Flows include contributions, benefits and value transfer, but exclude supplementary contributions and employers' imputed pension contributions. Revaluations will not depend any more on the term structure of interest rates. Instead, the price components in a DC scheme will be the change in prices on financial assets (equity, bonds).

The ESA manual on pension obligations intends to provide general guidelines to countries' statistical compilers. It has to be broad enough to cover many national practises, but also specific enough to offer real practical support. For the situation of most Dutch pension funds, nevertheless, a few practical obstacles emerge. For instance, actual contributions, as ESA prescribes, include not only actuarial contributions but other components as well, such as an extra sum for maintaining the regulatory own funds. This extra sum is required when a pension fund might be in deficit. This extra sum, however, should not be part of the pension entitlements of beneficiaries. Own funds serve as a cushion and need to be kept inside the pension fund.

In addition, employers' imputed pension contributions in ESA relate to a situation where employers structurally pay less or more than they should do in actuarial terms. In the Netherlands this is not the case as employers and employees negotiate to agree on contributions each party has to pay in order

to enable the pension fund to reserve enough money to fulfil its promise regarding future benefits.⁷ Dutch pension funds are obliged by the Pension Act to charge a cost-effective contribution. Thus, statistical guidance of ESA does not seem to fit completely in the Dutch context. Let us now move to this situation to see what we could learn.

3. Pension fund reporting in the Netherlands

In the Netherlands pension funds administer pension schemes that employers and employees have agreed upon. Funds must comply with the Pension Act and other relevant regulations, in order to ensure that the promised pensions can in fact be paid out.⁸ De Nederlandsche Bank (DNB) is the supervisor of pension funds in the Netherlands, and concentrates on prudential and material supervision. Prudential supervision focusses on requirements regarding financial soundness like sound and controlled operations, minimum own funds, technical provisions and expertise of policy makers. Material supervision is about articles of association and pension scheme rules such as agreements between the employer and the pension fund, and between the pension fund and its members.⁹ The box below summarises the Dutch occupational pensions system.

Box Occupational pensions in the Netherlands

In the Netherlands Dutch pension funds, insurers and premium pension institutions can offer work related pension schemes. Pension funds are the biggest provider and predominantly operate DB schemes based mostly on an average pay plan. They guarantee nominal future benefits and may index these if the financial condition of the fund allows it. Pension funds have to maintain sufficient own funds as a buffer cushion to absorb financial shocks. If stock prices suddenly fall, then a buffer may prevent that the pension fund will run into a deficit. This buffer is expressed in the "required funding ratio". Pension funds are financially healthy if they meet the required funding ratio. Under the Financial Assessment Framework introduced in 2007, pension funds facing a funding deficit must submit a recovery plan to supervisor DNB. In this action plan pension funds show which measures the plan foresees to restore their funding ratio ¹ to the required funding ratio within ten years at most. Recovery may be achieved in many ways, such as (partly) skipping indexation, requiring additional contributions, changing investment plans and cutting benefits. Cutting benefits is one of the most drastic measures, only used as an ultimatum remedium. If curtailments are unavoidable, a pension fund is allowed to spread these over a recovery period of at most ten years. The supervisory framework thus allows funds to absorb shocks more gradually, negative as well as positive shocks. Since 2007 members' and retirees' future benefits have to be discounted at variable market rates (a yield curve of swap rates). Before, a fixed discount rate was used.

¹ This is the Policy funding ratio: average funding ratio over the past twelve months.

⁷ Actual contributions falling below the cost-effective contribution imply a contribution reduction. Contribution reductions may be given only subject to very strict conditions.

⁸ DNB, Open Book Supervision.

⁹ In the Netherlands the Financial Markets Authority is responsible for conduct supervision.

One of the tools for off-site supervision are periodic reports submitted to DNB. Below is an example of the report on technical provisions of an individual pension fund (fictitious numbers).

Figure 2 Report on development of technical provisions for the funds' risk – statement J602
 relation id: 9999 relation name: XYZ

<i>Part 1 Contributions, benefits, value transfer</i>		
1.1	Technical provisions end of previous book year	7.475.795
1.2	Contribution required actuarially for new unconditional obligations	88.794
1.3	Addition of administrative costs	32.223
1.4	Required addition of interest rate amount	28.680
1.5	Pension liabilities taken over	12.059
1.6	Benefits	-248.018
1.7	Released of costs from technical provisions	-4.317
1.8	Pension liabilities transferred	-4.164
1.9	Other	-2.595
<i>Part 2 Change in the pension scheme or pension level</i>		
2.1	Indexation of retirees	147.707
2.2	Indexation of deferred members	115.367
2.3	Indexation of members	73.997
2.4	Other	0
3.1	Change as a result of changing term structure of interest rates	1.532.884
4.1	Modification of actuarial assumptions and principles	44.228
<i>Part 3 Experience</i>		
5.1	Mortality experience	-4.861
5.2	Disability experience	-372
5.3	Other changes	1.354
5.4	Experience on other technical assumptions	0
6.1	Technical provisions end of current book year	9.288.761

In this yearly report pension funds have to fully reconcile the change in technical provisions from the start of the year until year-end position. The starting point is how much money is actuarially needed for new unconditional pension claims, i.e. current service (row 1.2). This can be different than the actual received contributions as these contain also an extra sum for maintaining the regulatory own funds. Administrative costs are added too (row 1.3). Further, an interest rate amount is added to account for past-service (1.4). Next, pension liabilities taken over from another pension fund (e.g. in liquidation) or from an insurer (e.g. one or more portfolios) are added to provisions (1.5) while outgoing value transfers diminish provisions (1.8). Benefits decrease technical provisions (1.6). Most of these flows in part 1 are of the transaction type.

In the second part of Figure 2, changes in the provisions due to indexation is accounted for. Indexation can be unconditional or conditional upon the financial health of a pension fund (rows 2.1 – 2.4). When the pension agreement between employer and the employees includes automatic compensation of wage or price inflation, pension funds already consider this in the financial set-up.

Therefore, unconditional indexation, component of the actuarial contribution, is treated as a transaction. Allowance for conditional indexation is seen as a price increase (revaluation) as it increases the valuation of accrued pension rights. Similarly, if benefit cuts might occur these are also (negative) revaluations (this example of revaluation is not mentioned in ESA). Row 3.1 points to changes in the term structure of interest rates. According to the supervisory framework, pension funds with DB schemes have to discount their future income streams against a yield curve of swap rates. This item is therefore classified as a price change. Row 4.1 shows the impact on pension fund liabilities of changes in the actuarial valuation methods (e.g. update of mortality tables). And should belong to other changes in volume (not transactions nor price changes).

Figure 3 Allocation of pension fund's changes in technical provisions to price and to volume

										Amounts in thousands of euros	
Liabilities: Technical provisions											
Form	Type of provision	Sector of policy holder	Country of policy holder	Position begin of period	Liability					Position end of period	
					Changes during the year						
					Transactions		Revaluation		Other changes in volume		
Additions	Reductions	Exchange rate changes	Price changes								
PV-LP	Pension provisions	<all>	HH	7.475.795	500.179	-261.730	0	1.532.884	41.633	9.288.761	
PV-LP	Overige technische voorzieningen	<all>		0	0	0	0	0	0	0	
PV-VV	Vooruitbetaalde premies	<all>	<all>	0	0	0	0	0	0	0	
PV-VV	Voorzieningen voor openstaande aanspraken	<all>	<all>	0	0	0	0	0	0	0	
PV-OV	Overige voorzieningen			0	0	0	0	0	0	0	

Form J602 (Supervision yearly report)		Development of technical provisions for the funds' risk	
Relatie-id: 9999		Relation name: XYZ PF	
		year 20..	
<i>Part 1 Contributions, benefits, value transfer</i>			
1.1	Technical provisions end of previous book year	7.475.795	
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The third part concerns actuarial gains and losses (5.1 – 5.4). If the experience of mortality, on disability, on other changes and on other technical assumptions develops differently from calculated, then pension funds will make a gain or a loss. Mortality gains for the fund, for instance, will reduce technical reserves; losses on the other hand increase them. Gains and losses will flow to the profit & loss account. In this example, a small gain on mortality has been realised (EUR 4.8 million). As a result, reserves decreased, results rose and the own funds of the pension fund increased. These

types of experience could be treated as transactions as participants entering the pension fund had agreed to these conditions. Consequently, the following reconciliation can be made (Figure 3 above¹⁰). In this example transactions that added to provisions exceeded reductions. This was due to allowances for indexation. Price increase of EUR 1.5 bln enlarged provisions even more, as a result of falling interest rates. As a consequence, pension fund' liabilities rose by EUR 1.8 bln in this period.

4. Macro outcome of decomposition price and volume changes

This decomposition can also be made on an aggregate level for all pension funds. The box below shows how quarterly data on pension liabilities are compiled.

Box Quarterly data on pension liabilities

Policy makers appreciate yearly data, but are often more interested in a higher frequency, e.g. quarterly data. Also, organisations as the European Central Bank prefer to have more timely and more frequent data. In the Netherlands, the quarterly decomposition of statistics on pension liabilities develops in two stages. First, transactions are already reported quarterly as well as technical provisions (stocks). For every three month period the revaluation component is estimated as a residual, being the difference between the end-of-period stock of liabilities and the stock at the start plus transactions. Other changes in volume will be underestimated temporarily in this stage. Stage two starts when yearly data will arrive. The revaluation component and other changes in volume are reported for the year, as well as (possibly revised) transactions. Other changes in volume is allocated proportionally over the quarters, and differences between estimated revaluations per quarter and the one that is yearly reported will be removed. In this way, initial quarterly, partly estimated, data are replaced by data that are more precise in the second stage.

As can be seen, the changes in pension obligations from quarter tot quarter are large (Chart 2). On average, increases in technical reserves are greater than decreases. By far the largest contribution to these changes comes from revaluations.

Almost 72% of the cumulative changes in pension liabilities can be explained by price developments, 16% come from transactions, while 12% is due to other changes in volume.

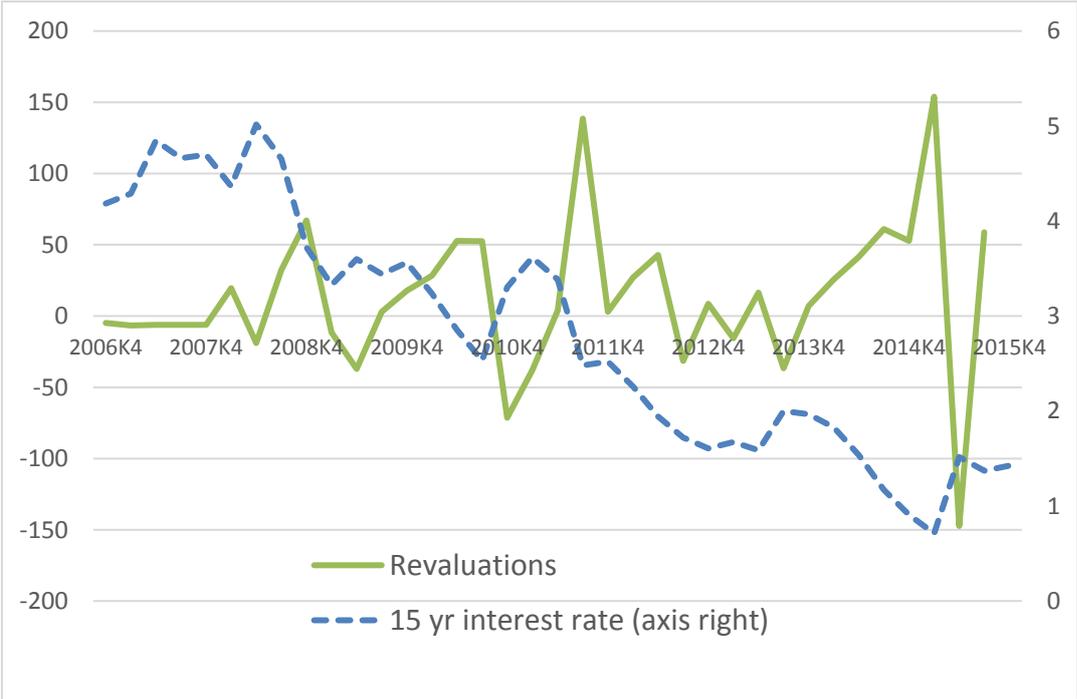
¹⁰ Thanks to Paul Witteman for his assistance to figure 3.

Chart 2 Price volume breakdown of pension liabilities, EUR billion



One of the main causes for revaluations, positive and well as negative, have been movements in interest rates (Chart 3). Here, price changes have increased (decreased) as interest rates declined (rose). In general, to a large extent the rise in pension obligations towards households, shown in Chart 1, is the result of a long-term downward trend in capital market rates.

Chart 3 Revaluation of pension entitlements (EUR bln) and interest rate (%)



4. Conclusions

The statistical guidance ESA provides is to a large extent useful to assist in decomposing technical provisions on pensions. Some basic elements one needs in practice are present and the general scheme could be valuable for many countries. Still, it remains an analytical scheme that cannot fit perfectly for every situation. In addition, the Supplementary Table on Pensions, in which changes in entitlements are elaborated the most, has a low frequency (once every three years) and is still in its experimental stage. Besides, reporters and compilers face here some issues that can be difficult to interpret. Alternatively, if one joins reporting practices of pension funds, one is able to make a price-volume breakdown of pension liabilities for DB schemes in a more refined way. Moreover, these data are more timely available and have a higher frequency too (quarterly basis). This last feature is important for policy makers and analysts. Quarterly data for the Dutch pension funds show that price movements account for almost 72% of all changes in technical provisions. The driving force of prices here is the changing yield curve due to financial market movements. The structural downward trend of long-term interest rates therefore explain most of the variations in pension fund obligations to households in the Netherlands.