Società italiana di economia pubblica
XVIII CONFERENZA

SERVIZI PUBBLICI.
Nuove tendenze nella regolamentazione, nella produzione e nel finanziamento

Pavia, Università, 14 - 15 settembre 2006

THE UNDERFUNDING OF THE US CORPORATIONS DEFINED-BENEFIT PENSION PLANS

VALENTINA FERRARIS, ref. – Ricerche per l'economia e la finanza: vferraris@ref-online.it
ANGELO MARANO, Presidenza del Consiglio e Università della Tuscia: an.marano@unitus.it
MARIO MARIANI, ref. – Ricerche per l'economia e la finanza: mariani@ref-online.it

March 2006. First revision May 2006. Second revision August 2006

The opinions expressed in the paper are authors' only and cannot be attributed to any institutions they belong to or collaborate. The research has been developed in the framework of activities of the reforme association and ref. research center and received financial support from the Direction de la recherche, des études, de l'évaluation et des statistiques (DREES) of the French Ministry of health and solidarities.

pubblicazione internet realizzata con contributo della COMPAGNIA di San Paolo

Abstract

Since 2001, a huge underfunding problem has emerged in the US defined-benefit private pension system, as well as in other countries, like the UK and the NL, that also rely heavily on such type of provision. The US Pension Benefit Guarantee Corporation (PBGC) estimates that underfunding of single-employer defined-benefit pension plans reached $450 billion in 2003-2005 (it was never higher than $110 billion until 2001); funds of the multi-employer schemes are short of further $200 billion, which means that total underfunding reached a record level of $650 billion in 2005.

We review the causes and consequences of such crisis and examines the answers the regulator is trying to give. Firstly, we discuss the main differences in funding between defined-benefit and defined-contribution plans and discuss the current trends in workers' coverage. Then, we define the financial and legal dimensions of "underfunding" and examine the causes of the crisis, which exploded with the burst of the financial bubble at the beginning of the decade and has since been exacerbated by the low level of interest rates which, however, highlighted other structural problems, such as the ageing of the American labor forces and the shift toward defined-contribution schemes. We continue showing how the crisis is impacting on both the PBGC, which guarantees part of the benefits, and workers, who are seeing the "un-guaranteed" part at risk; furthermore, it is also affecting companies' balance sheets, although more are in the "old economy" (manufacturing sector and air companies) than in the "new" economy. Finally, we discuss how such situation has triggered legislative intervention which brought to the 2006 Pension Protection Act finalized in August 2006.

Keywords: defined benefit pension schemes, underfunding of private pension schemes

JEL: G23

Contents

List of acronyms

ABO	Accrued benefit obligation
CSFB	Credit Suisse First Boston
DB	Defined-Benefits
DC	Defined-Contributions
DJIA	Dow Jones industrial average
FAS	Financial Accounting Standards
FRS	Financial Reporting Standards
IAS	International Accounting Standard
IRA	Individual retirement account
ERISA	Employee Retirement Income Security Act
FASB	Financial Accounting Standards Board
PBGC	Pension Benefit Guarantee Corporation
PBO	Projected benefit obligation
VRP	Variable rate premium
S&P500	Standard & Poor’s 500 index

Summary

- The fall of financial markets in 2000 and the protracted period of low interest rates triggered a deep crisis in the US system of defined-benefit private pension plans and added to more structural problems.
- Most of these schemes have found themselves underfunded; sponsoring companies, which during the ‘90s enjoyed substantial savings (or even “contribution holidays”), thanks to the interaction of a bull market and lax funding rules, should have substantially increased contributions to cover their pension liabilities by on.
- In effect pension contributions have been on the rise. However the extent of underfunding which came to light was such that many schemes – particularly in the transportation and in the other traditional industrial sectors – had to be shut down, with huge losses for workers and for the Pension Benefit Guarantee Corporation, the federal agency which insures defined-benefit schemes.
- Despite the strength of the US economy and the recovery of financial markets, the underfunding crisis persists, with total underfunding estimated at a record level of $650 billion in 2005, with several new and big defaults occurring and more likely to emerge in the near future.
- Not only is the crisis affecting the contributory burden firms have to pay, impacting their balance sheets, but it is also affecting company ratings, as rating agencies pay increasingly more attention to pension liabilities.
- The effects are unequally distributed among companies and sectors, depending on the type of pension scheme sponsored and on the structure and age of the workforce.
- Temporary solutions have been devised in recent years, mostly to contain the increase in contribution rates, which however left the underfunding problem itself unsolved if not worse.
- A more structural intervention has been finally agreed with the signing by the US President on 17 August 2006 of the 2006 Pension Protection Act, which however will mostly come into force in 2008 and the following years, as the legislator faced

the trade-off between securing pension rights and containing the costs companies face.

- Generally, the main hope of both corporations and the US legislator has seemed to be that sooner or later the performance of financial markets, and the rise in interest rates in particular, will reduce the scale of the problem ...
- ... while over the longer term the shift from defined-benefit to defined-contribution private schemes, with the consequent shift of the financial risks to the individual worker, is likely to continue and even accelerate as a function of the effectiveness of the new funding rules under scrutiny in the Congress.

1. Introduction

On 2 February 2005, the US Pension Benefit Guarantee Corporation (PBGC), the federal agency which insures members of the private sector Defined-Benefit (DB) pension plans, was forced to take over the US Airways Flight Attendants pension schemes, which were underfunded by $2.5 billion, of which $2.3 billion will be met by the PBGC.

On 10 May 2005, United Airlines, which had filed for Chapter 11 bankruptcy protection on December 2002, obtained a bankruptcy judge authorization to default on its pension plans, underfunded by $9.8 billion. It is likely that eventually a sum close to $6.6 billion will have to be met by the PBGC and $3.2 billion will be the loss of the 120,000 firm's workers and pensioners.

On one single day, 14 September 2005, two other major airlines, Delta and Northwest Airlines, filed for Chapter 11 bankruptcy; while this act by itself does not automatically imply default on pension obligations, the underfunding of the two companies pension plans ($10.6 billion and $5.7 billion respectively) could result in a loss[1] for the PBGC of $8.4 billion and $2.8 billion respectively and for loss of $2.2 billion and $2.9 billion for the workers.

On 10 October Delphi, the world's second largest automotive part company (whose pension plans are underfunded by about $4.3 billion) filed for Chapter 11. This could trigger General Motors too to do the same (underfunding of about $10 billion) since Delphi was spun off from GM in 1999 and GM still backs some of its pension obligations.

The PBGC estimates that underfunding of US corporations single-employer DB pension plans reached $450 billion in 2003-2005 (it was never higher than $110 billion until 2001, see **Graph 1a**). This resulted in losses for the PBGC of $23 billion in 2004 and 2005 (never higher than $3.6 billion until 2002, see **Graph 2**). Funds of the multi-

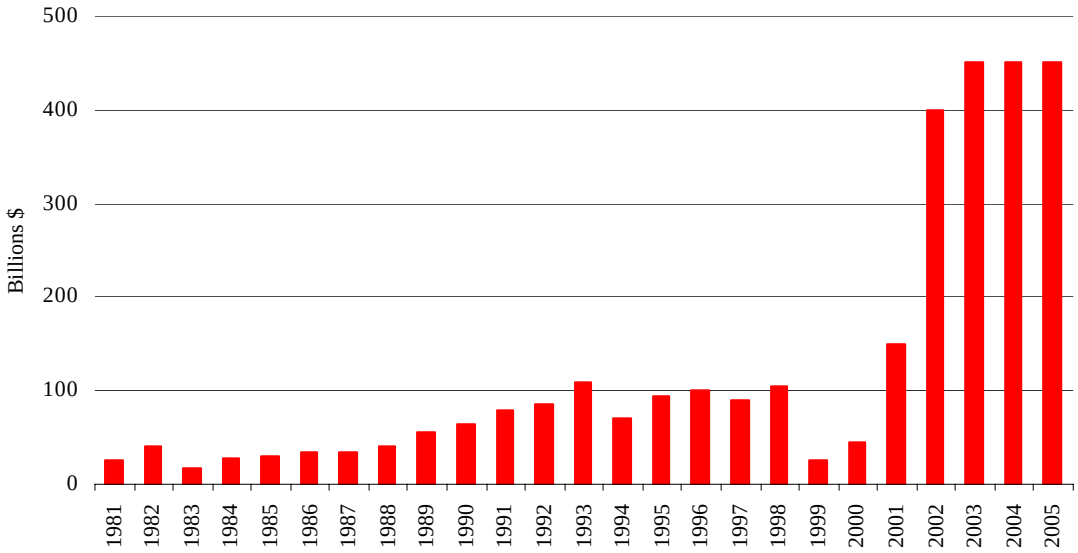
[1] Measured as the negative balance between the total value of the assets from terminated plans the PBGC appropriates and the total value of the pension payments the PBGC will take charge of.

employer schemes are short of further $200 billion, which means that total underfunding of the US DB pension schemes reached a record level of $650 billion in 2005 (see **Graph 1b)**.

These data give a dramatic idea of the dimension of the crisis that is hitting the US DB private pension plan system developed during the ‘60s and ‘70s by US corporations. The PBGC is intervening heavily to rescue many plans, but it seems that the situation is still deteriorating, with doubts arising over not only the future of the corporate DB pension system, but also the payment of pensions to current retirees and the loss of pension rights for workers close to retirement. On August 2006 the US legislator finalized a new law aimed at strengthening the system, which however will only come into force gradually and whose effects on the overall DB system are still uncertain.

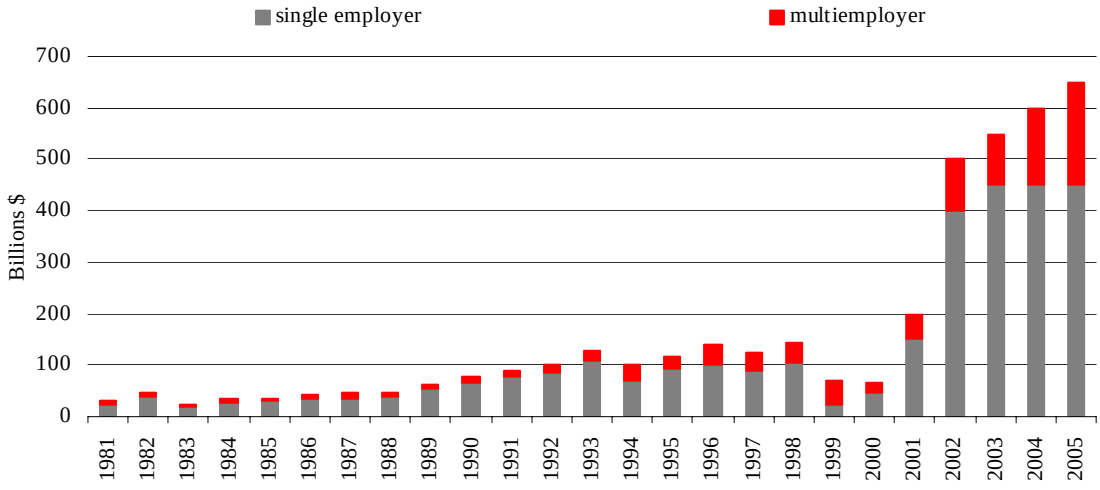
This study focuses on the underfunding of DB pension plans in the US; it analyses the causes and consequences of the current crisis and examines the legislative interventions it triggered. Section 2 discusses the main differences in funding between DB and Defined-Contribution (DC) plans and shows how DB schemes are giving way to DC schemes. Section 3 defines the financial and legal dimensions of “underfunding” and examines the causes of the current crisis, which exploded with the burst of the financial bubble at the beginning of the decade and has since been exacerbated by the low level of interest rates which, however, highlighted other structural problems, such as the ageing of the American labor forces and the shift toward DC schemes. Section 4 shows how underfunding is having a strong impact on both the PBGC, which guarantees part of the benefits, and workers, who are seeing the “un-guaranteed” part at risk; furthermore, it is also having an impact on balance sheets, although it is affecting “old economy” big corporations much more than those in the “new” economy. This situation has triggered legislative intervention (Section 5) designed: (i) to offer firms some temporary relief and to avoid excessive increases in pension contributions, without, however, addressing the substance of the problem; (ii) to identify more structural solutions, recently finalized by the new 2006 Pension Protection Act, which will only gradually come into force, however, and which still leave uncertain the future of the overall DB system, facing the need to tackle the trade-off between securing workers’ pension rights and containing the increase in costs for firms. Section 6 concludes.

Graph 1a - Total underfunding of US single employer plans 1981-2005



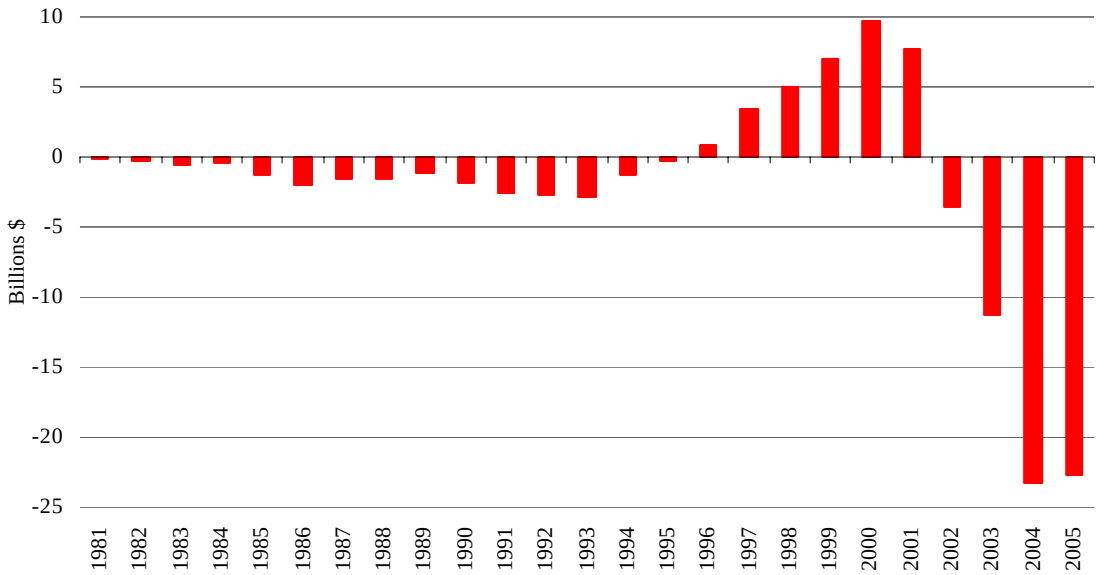
Source: PBGC (2003b) till 2002 and PBGC (2004 and 2005a) since 2003.

Graph 1b - Total underfunding of US single employer and multiemployer plans 1981-2005



Notes: Total underfunding for single employer plans is as reported in PBGC (2003b) and as updated in PBGC (2004 and 2005a). Total underfunding for multiemployer plans refers to the Internal Revenue Service form 5500 filling as reported in the PBGC Annual Pension Insurance Data Book untill 2002 and as stated in PBGC (2004 and 2005a) since 2003.
Source: PBGC and our elaborations.

Graph 2 - Net loss of PBGC for single employer plans 1980-2005



Source: PBGC Annual Pension Insurance Data Book .

2. Defined-benefit vs. defined-contributions plans and the role of the Pension Benefit Guarantee Corporation

There is a growing worldwide diffusion of DC schemes among fully-funded, private pension plans, where benefits are dependent on contributions paid[2], on the performance of financial markets and on participants' life expectancy at each retirement age. In many countries, however, notably the United Kingdom, the Netherlands and the Unites States, private DB schemes still play a major role. These schemes, which are generally promoted and sponsored by employers, typically offer a certain percentage of an individual's wage[3], so that the value of the benefit is substantially pre-determined and the financial risk is entirely borne by the scheme's sponsor, i.e. the employer.

While in at least two of the three countries mentioned above (US and UK) there is a clear tendency to substitute DB with DC schemes, the former are still the main type of

[2] Typically with contribution rates constant during a worker's working life.
[3] For example 1/60 of each year worked, so that with 40 years of contribution the worker would get a 2/3 replacement rate. The pensionable earnings may be an average value of wages over the entire working life or over the last few years of career, less often a fixed amount.

private scheme for current pensioners and workers closer to retirement. In fact DB schemes were the traditional pension arrangement used in the past by firms in the manufacturing, transportation and utilities sectors, which hired large numbers of permanent employees[4]. **Graph 3** shows how the relative weight of the US DB and DC schemes has changed over time: total membership of DB plans is stable at around 40 million, which, however, hides a substantial reduction in active members, which fell from 78% (1980) to 53% (2000) of the total; participation in DC plans, on the other hand, has increased constantly and grew more than threefold between 1980 and 2000, from 18 to 62 million. Among workers with at least one pension plan, members covered by a DB scheme only fell from 60% of the total in 1980 to 13% in 1999, while in the same period members covered by a DC scheme only increased from 30% to 58%, with a stable proportion of around one third of total workers participating in both (**Graph 4**).

In DC plans the pension scheme funding and solvency is guaranteed – except in pathological cases – by the fact that in each instant the pension scheme's liabilities adjust to the value of its assets. In effect it is the individual who bears the entire financial risk, while the firm's obligations basically end with the payment of the predetermined contributions to the plan[5]. In DB schemes, however, it is the sponsor - the employer - who bears the financial risk, because contributions must adjust to fund fixed-value future liabilities, while the pension scheme's asset values vary as a function of the financial market performance.

This characteristic of DB schemes has two key implications.

Firstly, as opposed to DC schemes, the definition of the funding required is ambiguous and leaves wide margins of freedom. As for liabilities, the pension debt depends upon the parameters used in calculating the present value of a future (after retirement) flow of annuities and its value depends on the individuals' future (from now to retirement) wage dynamics, retirement age and life expectancy.

---

[4] Private DB schemes were thus playing a role which in most other industrialised countries had gradually come under the sphere of attribution of the public social security system, which in the US was thus left dealing with poverty reduction only (which typically implies offering flat rate benefits) rather than with the goal of maintaining workers' living standards after retirement.

[5] Things may be more complicated in practice, depending for example on the instrument used by a firm to make contributions or on the constraints it puts on the pension plan's asset management, but the principle that once a firm has paid its contributions to the plan it does not have other obligations remain valid.

As for assets, the value of expected returns on a plan's investments must be calculated. The law (see below) requires private DB schemes to be funded, so the law itself must also specify how to calculate funding in actual practice. Depending on the methodology and the actual parameters chosen, contribution rates – and therefore labor costs – can fall dramatically and the amount of the contributions payments may be deferred into the future, replicating in part the pay-as-you-go characteristics of public pension systems.

Secondly, a DB scheme may default: its assets may become insufficient to meet its pension obligations and the pension sponsor may not be in a condition to restore solvency, because it already is in a difficult financial position or because it will be if it pays the greater pension contributions required. In such a situation workers and pensioners could end up losing a substantial proportion of their retirement income, which they thought to be safe, with serious social and economic consequences.

To guarantee adequate funding and to protect workers if their plans default, the US legislator regulated DB schemes in 1974 with the Employee Retirement Income Security Act (ERISA). The ERISA set funding rules (see next section) and created a federal corporation, the PBGC, which insures DB schemes[6].

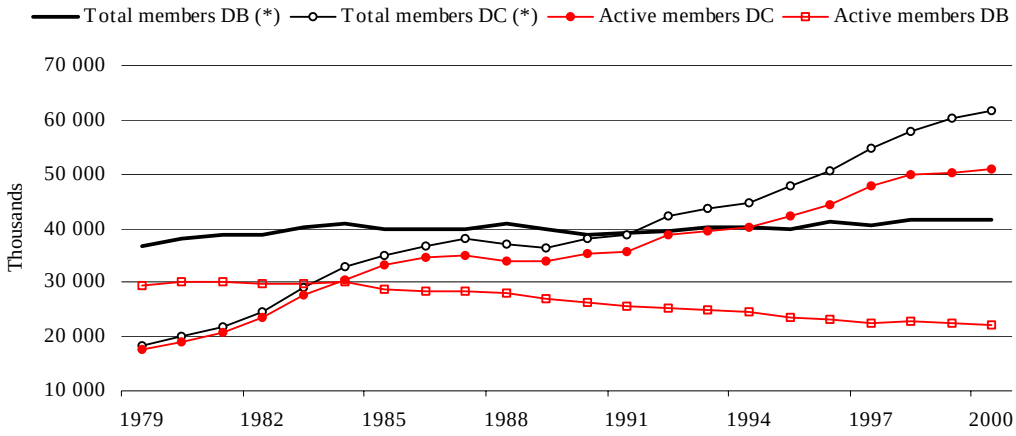
The PBGC distinguishes two types of DB schemes: single-employer and multi-employer schemes (i.e. plans destined to workers of just one company or which serve several companies' workers). For the first, the PBGC takes over a plan in default taking responsibility for its assets and liabilities for up to $47,659.08 per person per year in 2006. In 2005 the PBGC rescued 120 plans, which brought the total number of active and retired workers the PBGC have responsibility for to 1.3 million. For multi-employer plans the PBGC protection is lower, as it does not become the trustee, but only provides financial assistance through loans to insolvent plans, to enable them to pay benefits and this is only up to a maximum annual benefit guarantee of $12,870 per person.

The PBGC is not funded by transfers from the general budget (although its deteriorating financial position could force a public bailout in the future), but by premiums collected from the plans it covers, assets acquired from pension plans trusteed by PBGC itself, collection of employer liability payments due and investment income. In 1974 the

[6] A similar insurance scheme (the *Pension Protection Fund*) started to operate in UK in April 2005.

insurance premium – which should guarantee the financial solvency of the agency – was set, by the law, at just $1 per participant. For single-employer plans it has risen to $19 since 1991 and to $30 since 2006[7], to which add - since 1988 - a variable premium dependent on the plans unfunded liabilities and since 2006 a termination premium of $1250 per individual per three years in case a plane terminates, as shown in **Tab. 1**. For multi-employer plans, the premium has been brought from $2.60 to $8 per participant in 2006, this lower amount explained by the lower guarantee.

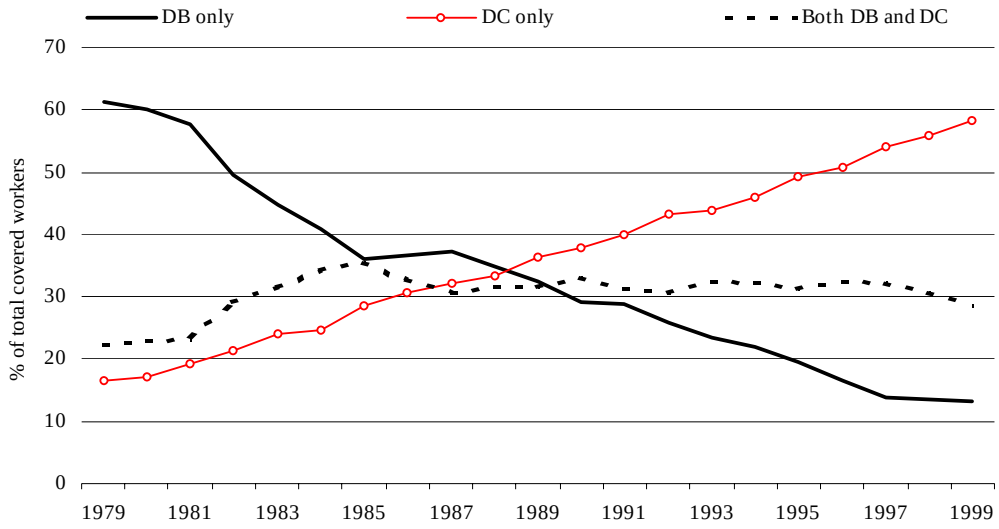
Graph 3 - Membership of DB and DC pension plans



Note: (*)Includes active workers (who participate in a pension plan, paying the contributions), retired and separated vested participants not yet in pay status. Includes also double counting of workers in more than one plan.
Source: US Department of Labor, Pension and Welfare Benefits: Private pension plan bullettin, Summer 2004 and July 2005.

[7] Such amount is indexed to average wage growth.

Graph 4 - Composition of active pension scheme members by type of plan



Source: US Department of Labor, Pension and Welfare Benefits: Private pension plan bullettin, Summer 2004 and July 2005.

Table 1 - PBGC historic premium rates for single employer and multiemployer plans

Period	Single employer plans				Multiemployer plans
	Flat-rate premium	Variable-rate premium		Interest rate used to calculate vested benefits	Flat-rate premium
	($ per participant)	*‰ of unfunded vested benefits (*)*	*maximum per participant ($)*		*($ per participant)*
Sep 1974 Dec 1977	1	none			0.5
Jan 1978 Aug 1979	2.6	none			0.5
Sep 1979 Sep 1980	2.6	none			rising from 0,5 to 1
Sep 1980 Sep 1984	2.6	none			1.4
Sep 1984 Dec 1985	2.6	none			1.8
Jan 1986 Sep 1986	8.5	none			1.8
Sep 1986 Dec 1987	8.5	none			2.2
Jan 1988 Sep 1988	16	6‰	34		2.2
Sep 1988 Dec 1990	16	6‰	34		2.6
Jan 1991 Jun 1994	19	9‰	53		2.6
Jul 1994 Jun 1995	19	9‰	53+20% of uncapped premium in excess	80% of 30-year Treasury bond	2.6
Jul 1995 Jun 1996	19	9‰	53+60% of uncapped premium in excess	80% of 30-year Treasury bond	2.6
Jul 1996 Jun 1997	19	9‰	none	80% of 30-year Treasury bond	2.6
Jul 1997 Dec 2002	19	9‰	none	85% of 30-year Treasury bond	2.6
Jan 2003 Dec 2003	19	9‰	none	100% of 30-year Treasury bond	2.6
Jan 2004 Dec 2005	19	9‰	none	85% of composite corporate rate bonds	2.6
From January 2006	30	9‰	none	85% of composite corporate rate bonds	8
From January 2006	Additional termination premium of 1250 per participant per year for three years in case of plan termination				

* Unfunded vested benefits are calculated by the PBGC as described in Section 3.

Source: PBGC: Pension Insurance Data Book 2005

3. Underfunding

As already mentioned, while DB schemes guarantee a set level of pension for workers, they may, however, end up being underfunded, which can lead to default. Problems with the solvency of pension plans can also extend to the sponsoring company, which bears the financial risk. Contributions vary as they must adjust to match the current and expected performance of financial markets in which the scheme's assets are invested, as well as the discount rate and the other parameters used to calculate liabilities. While contributions can fall, even to zero with bull markets or when interest rates are high, schemes may become underfunded with bear markets or when interest rates are low. Furthermore, the underfunding may worsen if the crisis (or stasis) of financial markets lasts too long, because companies may try to avoid raising contributions until all the legally available degrees of freedom are exhausted, possibly exacerbating the problem.

In order to understand these problems and put them into context one needs first to find if and when a pension plan is underfunded, that is, whether the scheme's assets are not considered sufficient to meet pension commitments to workers. Then, one must understand what happens when a plan is underfunded. While Box 1 discusses the issue in the general *financial* terms, Section 3.1 analyzes the US system *rules* for evaluating pension schemes' funding level and the *correction process* for insufficient funding, till the 2006 pension reform, thus dealing with the *legal* dimension of underfunding.

Box 1 - The financial dimension of underfunding

From a pure financial point of view, in a DB scheme a sponsoring company promises workers a certain benefit and allocates funds to the scheme which enable it to pay the benefit. Thus the pension scheme funding ratio is calculated as the value of its assets in relation to the value of its liabilities, i.e. the accumulated pension debt. However actual calculation of this ratio is not straightforward, because issues arise in valuing both assets and liabilities, which need to be considered separately.

The asset side

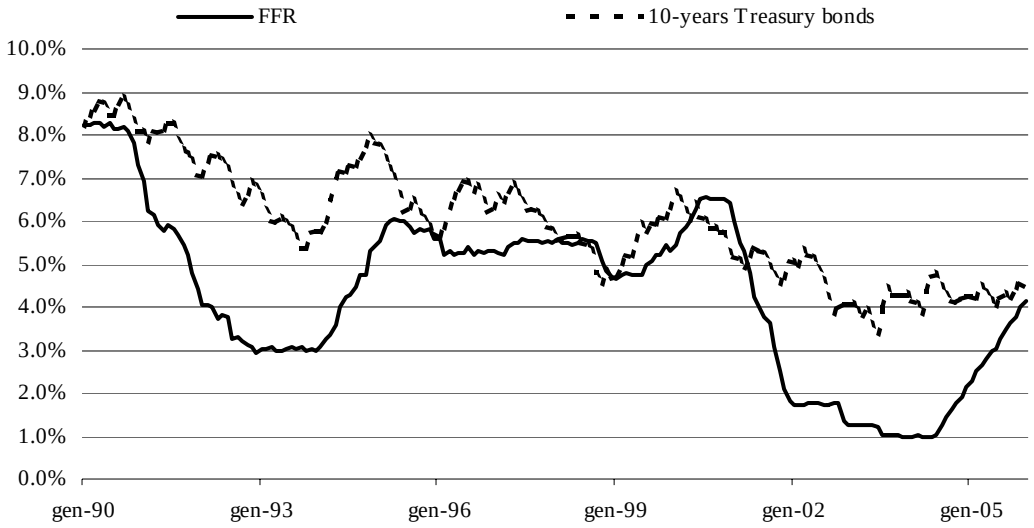
Given the portfolio of assets held by the pension scheme, the basic question is how to value it. One possibility would be to use the straight market value. However, the resulting valuation may be too volatile, which would reflect on funding ratios. Consequently sponsoring companies are generally allowed to smooth market values to a certain degree and to use expected returns based on actuarial estimates, which in turn will depend on the composition of the portfolio (bonds and equities) and on past performances. Indeed, as the OECD notes, "*the objective of a pension fund*

is to accumulate assets over the long-term on a systematic basis. Thus, the question from a long-term funding perspective is whether the market valuation on a single date is really appropriate for the valuation of long-term assets, accumulated with the view of a long-term holding period. For example, forcing sponsors to dramatically change their contribution rates as a function of a single day's market value may create large volatility in contribution rates" (OECD 2005b, p. 74).
This, however, as will clearly emerge in Section 4.1, also triggers some degree of hysteresis, as prolonged periods of bull markets increase the value of assets and lead to high expected returns (and discount rates); when the trend changes, these high expected returns may persist, which, together with the smoothing of asset value, may delay an appropriate reaction to the resulting underfunding and make things worse.

Pension liabilities
Valuing the liabilities of a pension scheme is even more difficult. They are determined by two dimensions: the benefit promised to workers and the discount rate used to calculate the present value of future obligations.
In a DB framework, the calculation of promised benefits requires some assumptions to be made on:
- when and with what length of service each worker will retire;
- what her or his salary will be during the last years at work;
- what her or his life expectancy will be at retirement.

Clearly, to just consider current salary is not enough, because most work histories are characterized by some career components, at the collective and/or the individual level. Consequently accurate valuation of the payments of a future pension scheme should be based on a "Projected Benefit Obligation" (PBO) method, taking into account current salaries, the effects of future wage rises on the currently accrued pension obligation and the effects on the plan's obligations of the worker's expected further years at work.
However, future wage rises and working years are aleatory and so the associated obligations do not constitute pension debt in the strict sense before they actually accrue. Accordingly, an alternative Accrued Benefit Obligation (ABO) method is used most of the time, which is based on current wages only. Moreover, ABO itself can be interpreted in different ways: in particular, it can be looked at as "termination liabilities", if calculated by giving a market value to the accrued obligations, or as "current liabilities", if valued just using the legal rules, which, as explained in Section 3.1, allow the valuation to be based on parameters that lead it to diverge from the market values.
The other important factor for valuing pension liabilities is the discount rate, which should reflect the long term and low volatility characteristics of pension obligations: thus a long-term risk-free interest rate should be used. When this interest rate rises, the value of future obligations falls and vice versa. In fact the low long term rate prevailing in the US (**Graph 5**) and on international markets since 2002 has added to the effects of the 2000-2002 stock market crash (**Graph 6**), a rule of thumb being that each 10 basis point change in the discount rate leads to a 1 percent change in PBOs (IMF 2004). In effects, as we will see later, the change of the discount rate used to value liabilities was at the center of the policy interventions dealing with underfunding.

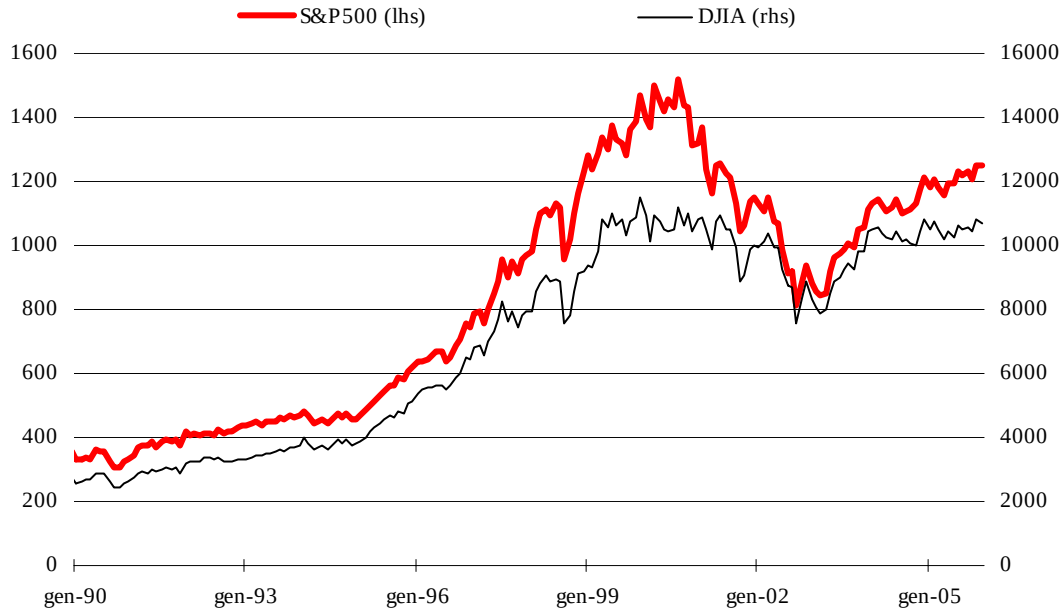
Graph 5 - Federal fund rate and 10-year Treasury bond rate in the US



Note: * Monthly data, Treasury bond rate is the market yield on U.S. Treasury securities at 10-year constant maturity, quoted on investment basis

Source: Us Federal Reserve Bank System

Graph 6 - Stock market indices



3.1 The legal dimension of underfunding

Contributions required by sponsoring companies are not determined by the most stringent definition one might imagine on the basis of the financial considerations in Box 1, but rather by a specific "legal" definition of underfunding, which may be much less severe. Indeed, legal funding requirements are linked to fiscal legislation, because contributions are tax deductible: consequently tighter rules on funding not only increase sponsoring companies' costs, but they also reduce fiscal revenues and increase public deficits (or reduce surpluses).

In effect, different legal definitions of funding have been adopted in different periods, with different effects on pension contributions and fiscal revenues. In fact some of the causes of the current problem date back to more than twenty years ago, in the mid '80s, when some of the decisions on funding requirements were made, based on the young age of most workers in the big corporations of the manufacturing and transportation sectors, the typical sponsors of DB plans.

Funding requirements for DB plans were introduced in 1974 by the ERISA and were based initially on the PBO method and the requirement for uniform contribution rates over a workers' career[8]. This caused a substantial increase in contribution payments compared to the previous situation until the beginning of the '80s.

In the middle of the '80s, however, as shown in **Graph 7**, both total and per-capita contributions started to fall. In effect, in some years, notably in 1986 and 1987, the funding requirements were modified, firstly changing to contribution rates rising with age and then basing them on the ABO rather than the PBO principle[9]. These changes produced substantial savings for companies, as the age of workers in the manufacturing and transportation sectors was still young, while at the same time they increased tax

[8] More precisely, the PBO method was applied in a "entry-age normal cost" specification, which calculates the contribution rate as the ratio of the value of all total retirement benefits that will be paid to the worker (discounted back to his/her date of hire) to the value of all working life wage payments (also discounted to his/her date of hire).

[9] The changes were driven on the one side by companies' goal of reducing contributions, on the other by a converging policymaker need of limiting tax deductions. First, in 1986, the Financial Accounting Standards Board adopted an accounting standard for pension obligation which considered future wage rises but not the further years at work. Then, the 1987 Omnibus Budget Reconciliation Act went further, setting a maximum deductible contribution level based on the ABO current liabilities method.

revenues, in years in which a successful effort was made to curb the public deficit (Schieber and Shoven 1994, Schieber 2001).

If we now look at the rules on funding in more detail (which, according to the 2006 Pension Protection Act, will continue to apply till the end of 2007) and not considering the temporary relief intervention (described below in Section 5), we see again that funding is not a straightforward concept, with even ERISA itself containing more than just one definition and others being used in the tax law or by the PBGC or in the financial statements. Furthermore, as already mentioned, not only must the definition of funding be considered but also minimum funding thresholds and the underfunding correction process. In any case, and differently with respect to other countries like the UK, the funding assessment is done on an annual basis.

Deficit Reduction Rules

The most important definition of funding is that associated with the ERISA Deficit Reduction Rules. It allows a choice for the valuation of assets of either the fair market value or a 'smoothed' value that "recognizes changes in fair value in a systematic and rational manner" over a period no longer than five years. There are more rules for liabilities, where ABOs are calculated by using prescribed mortality tables and a set discount rate, which was defined as the four-year weighted average yield on the 30-year treasury bonds, replaced in 2004 by an average of high-rated long-term corporate bonds (see section 5; the rate used may range from between 90% and 105% of this figure). Other assumptions (like retirement rates and retirement ages) are left to actuaries.

Furthermore, while this funding definition leaves a fair degree of leeway for companies in the calculation of their funding requirements, additional contributions are only due when the funding ratio (assets to liabilities) falls below 90% for two of the previous three years or when it falls below 80%. In this case supplementary contributions must be designed to make up the shortfall in funding, with three to five years allowed to return above the 80% threshold and seven years to reach 90%. Moreover, in these cases (as in some other cases), contributions have to be made on a quarterly (as opposed to an annual) basis.

General Contribution Rules

Once a plan is funded above 90% according to the ERISA's definition under the deficit reduction rules, funding requirements become much easier, leaving more leeway for companies to choose their funding strategy: as a matter of fact they can base it on the ERISA General Contribution Rules, which not only allow assets to be valued according to the previous set of rules, but also mortality tables and discount rates to be used which the actuary considers as the best estimate. Furthermore, any funding below 100% can in this case be covered on a long-term basis, because gains and losses may be amortized over 5 years, the effects of changes in actuarial assumptions over 10 years and plan improvements and the effects of initial past service liabilities (such as the effects of wage raises) over as long as 30 years.

The credit balance mechanism

There is another mechanism linked to minimum funding thresholds that may substantially affect contributions. When a sponsor has contributed to a plan more than the minimum it should have (because of actual contributions paid, or because returns on the assets have been particularly high in a given year, or even because the company changed the parameters used in the calculations), the law allows the sponsor to retain a "credit balance" that it can spend in following years, even if the plan becomes unfunded and even if it emerges that assumptions of expected returns were too optimistic. Moreover, the law recognizes an interest rate on credit balances equal to the one used by the actuary who evaluate the plan assets, i.e. the expected long-term return on pension plan assets, so that the amount the sponsor can compensate increases autonomously from one year to the next.

The funding rules for the PBGC variable premium

Funding ratios not only apply to company contributions, but also to the quantification of the variable premium single-employer plans must pay to the PBGC in the event of underfunding, which, as seen in **Tab. 1**, is currently at 9‰ of unfunded benefits. The funding definition used by the PBGC for this purpose is the same as that used in the

Deficit Reduction Rules (with plans having to use the same assumptions and methods used in that assessment), however, there are two differences: the funding ratio that triggers the variable premium is 100% (instead of 80% or 90%) and the discount rate that must be used is lower, at 85% (instead of 90%-105%) of the 30-year Treasury bond rate (till 2003) or of the average of long term corporate bonds yields (from 2004). It follows that on both respects the PBGC funding rules are tighter than ERISA's, although both are based on the ABO – rather than the PBO – principle and both allow for smoothing in the valuation of assets.

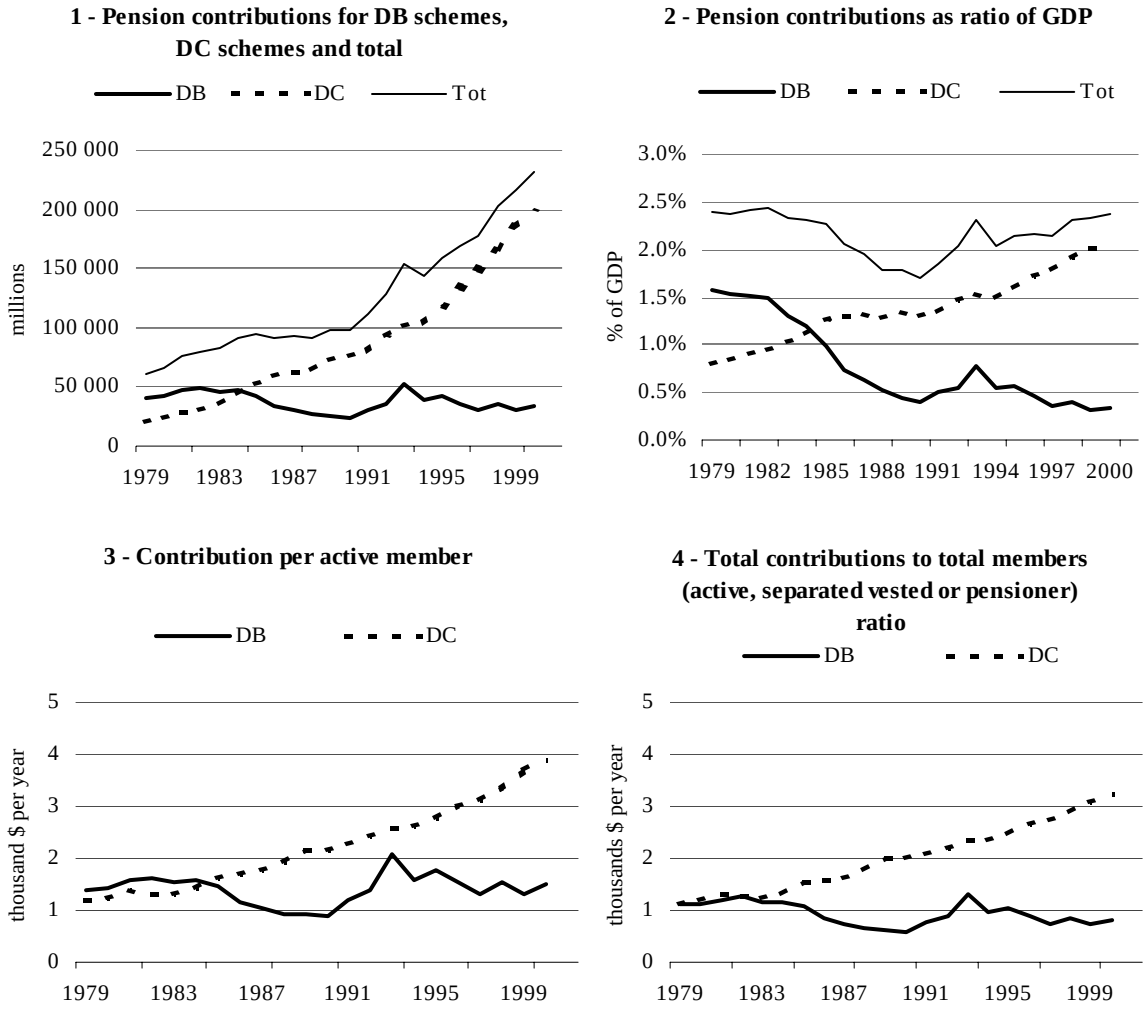
Maximum funding threshold for tax-deduction of pension contributions

As has been said, pension contributions are tax deductible and therefore there is also a maximum funding threshold above which the tax concession stops. This threshold is reached when the plan's assets (valued as above) reach the greater of 90% of ABOs or 100% of PBOs.

Financial disclosure and the FAS 87 accounting standard

Accounting rules require companies to report on pension plan assets and obligations in their balance sheets. The US regime is based on the FAS 87 standard, which allows corporations to value assets in the same way as in the deficit reduction rules (thus smoothing up to 5 years) but also requires to disclose the fair market value in the notes to the financial statements. Calculation of liabilities is based on the PBO principle, while both ABOs and PBOs must be reported in the notes. Smoothing is not only allowed while valuing assets, but also in the profits and loss account, when assessing both the difference between expected and actual returns and the actuarial gain or loss on projected liabilities (IMF 2004).

Graph 7 - Pension contributions in the period 1979-2000



Source: US Department of Labor, Pension and Welfare Benefits: Private pension plan bullettin, Summer 2004 and July 2005.

4. The underfunding crisis

While the funding rules enacted since the mid '80s allowed for a certain amount of "legal" underfunding (i.e. a funding gap with respect to the most stringent definition), the aging of the baby boom generations would have required companies to gradually fill the gap, i.e. contributions should have risen in any case because, with an increasing proportion of a scheme's members approaching retirement, the value of obligations

estimated by the ABO "current liabilities" method would converge on what would result from valuing the ABOs in terms of "termination liabilities", which would also converge on the value of PBOs. Furthermore, there would be no room left to play with the value of the discount rate or the valuation of assets, at least for workers choosing to annuitize their pension benefits.

The need for higher contributions has been fostered further by the fact that the big corporations of the manufacturing and transportation sectors have gradually stopped hiring new workers, with the result that DB members started aging without younger cohorts entering the pension schemes (younger workers entering the labor market have been offered DC schemes instead – like the 401k – or even individual accounts like the IRAs). As a consequence, DB schemes could no longer use a "pay-as-you-go like" mechanism to pay benefits, as might have occurred if the DB schemes enjoyed a demographic equilibrium. In fact Shieber and Shoven (1994) forecasted that the assets of DB schemes would be exhausted by around 2040 (**Graph 8**).

This framework of structural weakness was then affected by events on financial markets at the beginning of the '00s. The stock market crashed in 2000 and did not start to recover until the beginning of 2003 (**Graph 6**), which stopped the accumulation of assets for all types of pension schemes and decreased the value of DB plan assets by almost 20% in 2002 (**Graph 9**). Long-term interest rates fell from 7% to 4% in the 2000-2003 period and then remained at the 4%-5% level till the end of 2005, even in spite of a 3 point rise in the federal funds rate in the mid 2004 – end of 2005 period (**Graph 5**).

Such trends had a strong impact on funding valuation, unveiling a huge unfunded pension debt owed by a substantial portion of the US corporate world[10] and the urgent need to raise contributions.

Sponsors, however, tried to avoid excessive increases in their costs using the degrees of freedom allowed by the legislation, in the hope that more positive performance of financial markets would solve the problem. However, the situation improved only slightly with the return of a bull market in 2003, because long term rates remained very

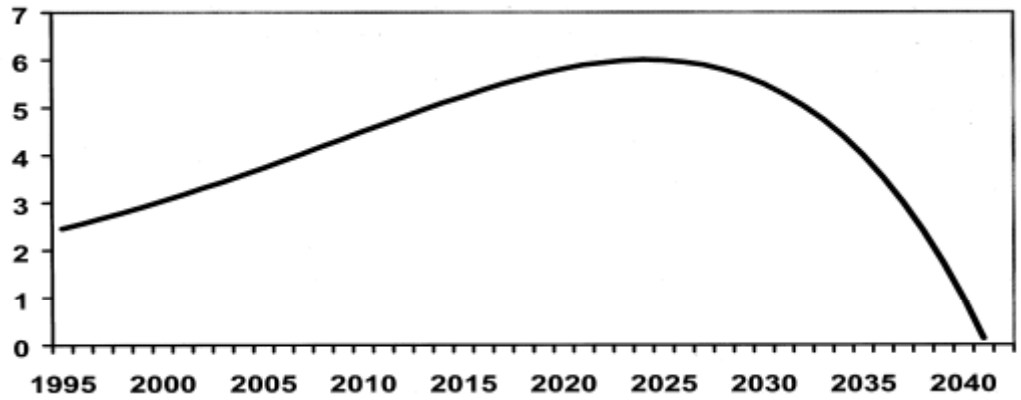
[10] The same happened in the UK.

low while the funding rules had allowed the accumulation of an even greater funding gap. Several sponsors started to default on their pension obligations, while at the same time, as a consequence of the 2001-2002 financial scandals (Enron, WorldCom), the market started paying an increasing attention to companies' pension liabilities and to just how underfunded their plans were.

The rest of this section goes into more detail on various aspects of the underfunding crisis: the delay in adjustment allowed by the funding rules (Section 4.1), the situation of the PBGC (Section 4.2), the effects on financial markets (Section 4.3).

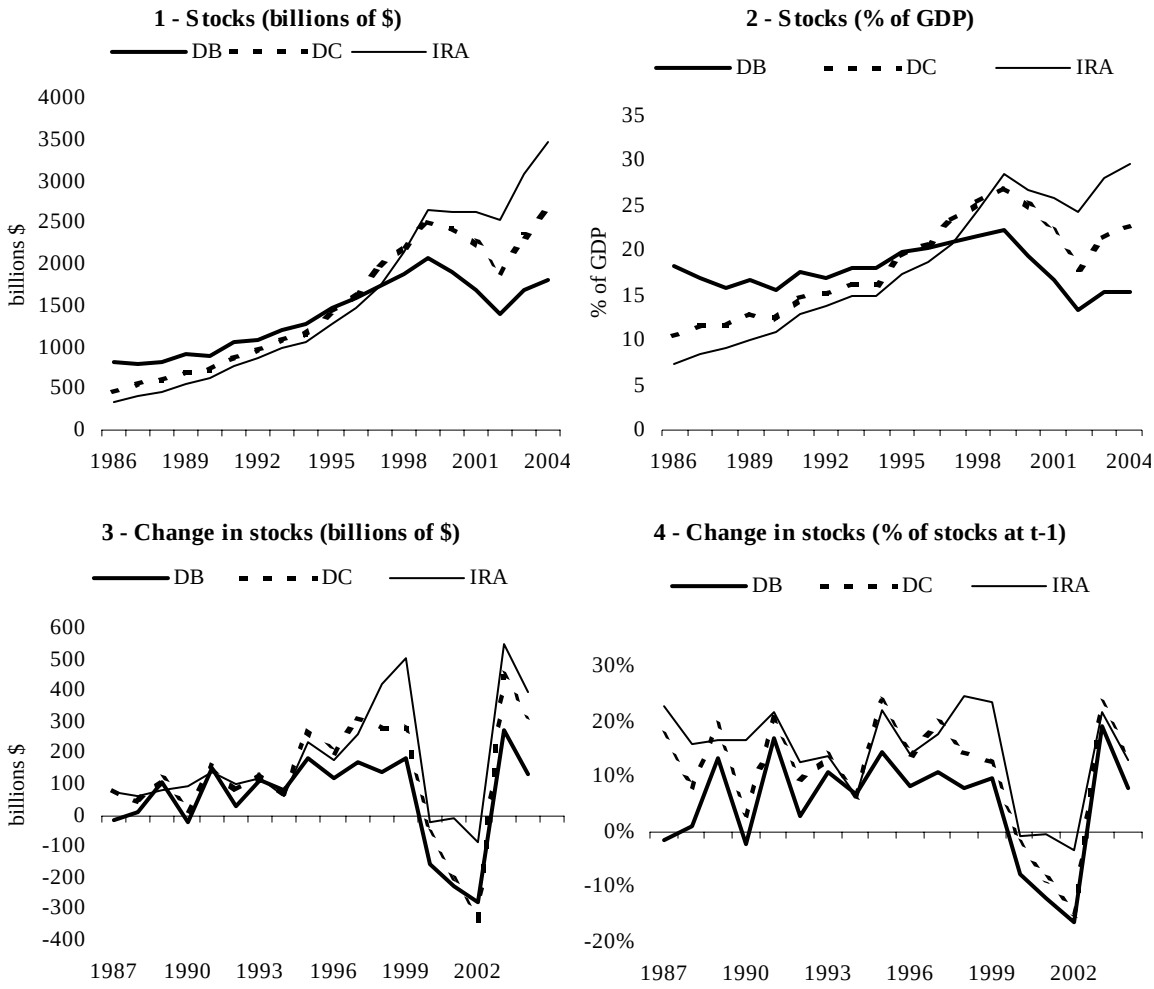
Graph 8 - Projected assets of US defined benefit private pension plans

$ trillion



Source: Schieber 2001, which assumes the contribution rate and the benefits formulas underlying the analysis in Schieber and Shoven (1994).

Graph 9 - Financial assets of US private pension schemes
DB, DC (including 401k) and IRA plans



Source: Board of Governors of the Federal Reserve System: Flow of Funds Accounts of the United States, 2005.

4.1 Too much freedom?

The freedom to "smooth" asset valuations, the time lag allowed to recover from underfunding and the credit balance mechanism all generate a time cushion which insulates companies from short term trends and reduces volatility in the contributions due. At the same time, however, the cushion itself leaves sponsors a lot of leeway to shift contribution payments into the future and to plan their funding strategies around the 80% and 90% funding thresholds.

As a consequence, in periods of bull markets the increase in the value of a plan's assets can by itself cover the benefits accruing during a given year, allowing the company a "contribution holiday", which means that pension contributions due fall to zero, or the asset value can rise even more to produce positive operating income.

However, things may become much harder when financial markets continue performing badly – from the point of view of the funding of pension schemes – for several years and the degrees of freedom are exhausted. In fact in these cases the cushion may end up by exacerbating the problem and companies can be forced into pro-cyclical behavior, e.g. raising contributions sharply at precisely the moment when they most need relief, with the result that the diversion of a substantial portion of cash flow to fund the pension plans may further weaken balance sheets and increase leverage.

And it seems that this is exactly what has happened in the recent years. As a matter of fact, at the end of the '90s the bull market allowed sponsors not only to benefit from contribution holidays, but even to accumulate credit balances which they spend during the first years of the crisis. The subsequent stock market crash and the low interest rates were thus firstly dealt with by companies exploiting their margins of freedom and then, when these were exhausted, companies requested transitory relief. This however did not stop underfunding from building up, while an increasing number of companies were forced to default on their pension obligations.

To gain an idea of how funding rules contributed to slow funding and worsened the crisis, one should consider, for example, that smoothing asset values allowed the assumption of very high financial returns to be maintained even when the market sank: Credit Suisse First Boston (CSFB**)** estimates that in 2002 the median return assumed by US companies in the S&P500 sponsors of DB schemes for their plan assets was still 8.75%, which contrasted strongly with the –8.8% final performance of the US stock market in that year (CSFB, 2003)[11].

One may also look directly at "contribution holidays": according to the Government Accountability Office of the US (2005), which placed the underfunding issue on the "high risk list of government operations facing significant vulnerabilities", during each

[11] US private pension schemes (as in the UK) invest a large proportion of their assets (65-75%) in equities.

year in the period 1995-2002 on average 62.5 of the 100 larger DB schemes received no contributions at all from their sponsor. Indeed, in 2002, when funding ratios had dropped sharply, average contributions for these schemes, which had been (at 2002 value) $62 million in the preceding eight years, peaked at $395 million ($246 million if one single sponsor's contribution is excluded). However, even in that year 45 plans were able to forgo any contribution.

Further evidence emerges if one looks at three of the main plans that had to be rescued by the PBGC, the United Airlines Pilots' Plan, the US Airways Pilot Plan (2003) and the plans of the steel giant Bethlehem (2003). According to the Deficit Reduction Rules, the first was overfunded until 2002 (102%) and funded at 80% in 2003, while the other two were still funded at 94% and 84% respectively in 2001. However, when termination liabilities had to be valued, it emerged that the United Airlines Pilots' Plan was funded at just 50%, US Airways' at 33% and Bethlehem at 45%. Underfunding amounted to 2.9 billion for the United Airlines Pilots' Plan[12], 2.5 billion for US Airways and 4.3 billion for Bethlehem. Even worse, the funding rules allowed all three companies not to contribute at all in the three years immediately before the default, none of the three had violated the Deficit Reduction Rules for the previous five years and none had to disclose any information to their members about the poor level of funding that eventually emerged. United Airlines even ended up with a credit balance of 0.5 billion.

Overall, as the Director of the PBGC said in 2003: "Current pension funding rules have acted to delay needed pension funding. Employers find that they are hit with substantial funding requirements when they can least afford them" (PBGC 2003a, p.4). In 2005 the new Director elaborated on the same subject: "The original funding targets were set too low and can be manipulated" (PBGC 2005b, p. 10) and, on another occasion: "Pension underfunding is neither an accident nor the result of forces beyond a company's control. On the contrary, it is a largely predictable and controllable by-product of decisions made by corporate management. (...) The tragedy is not that any of this was the result of illegal activity. The tragedy is that it was the result of perfectly legal activity under our

[12] For United Airlines the data presented here refer to just the pilots' DB scheme, while the $9.8 billions underfunding quoted in the introduction takes account of all DB schemes defaulted by the company.

system of flawed pension funding rules and inadequate premium structure" (PBGC 2005c, p. 2).

4.2 The effect on the PBGC

The PBGC has seen its financial position deteriorating sharply in the last years and fear is rising that it may not be able to maintain its obligations in the years to come, which would call for a bailout with public money. As seen in the introduction and shown above in **Graph 1 and 2**, in spite of strong investment returns in 2004 and 2005, the PBGC estimates that the underfunding of US corporations single-employer DB pension plans reached a record $450 billion in 2003-2005, which determined a net negative position for the PBGC of $23 billion in 2004 and 2005 (never above $3.6 billion till 2002). PBGC estimates of multi-employer scheme underfunding adds a further $200 billion, which brings total underfunding of DB plans in 2005 to $650 billion[13].

In the recent past the PBGC had to intervene to rescue practically all plans in the steel sector, while it is being called to intervene heavily in the air transportation and manufacturing sectors (particularly the metal and automotive industry) (**Graph 10a** and **Graph 10b**[14]). Indeed, of the 10 most costly rescues the PBGC carried out until 2005, 4 involved steel companies, 1 another company in the metal sector, 4 were airlines and the remaining one an insurance company; in total, these 10 rescues burdened the PBGC with more than $20 billion (about 1.1% of the total assets of DB pension funds in 2004) (**Tab. 2**). As seen above, if Delphi or GM also default on their pension obligations, the PBGC could be charged with something like a further $10 billion, which could definitely undermine its financial position. When a plan defaults, the PBGC is not alone in incurring costs. In fact the one most directly hit are the workers. As has been said, the PBGC only intervenes up to the statutory limits of $12,870 and $47.659 per person per

[13] This PBGC underfunding estimation is based on ABO termination liabilities and market value of assets, thus on a tighter definition of funding than those presented in Section 3.2, as it considers asset market value. However, it still evaluates liabilities in ABO rather than the PBO terms, thus underestimating the future pension payments.

[14] The two graphs show the higher incidence of claims in the manufacturing sectors (and particularly in the primary metals sector), than in the service sectors (wholesale trade, retail trade, finance insurance and real estate and other services). These represented more than 35% of total PBGC-Insured plans participants in 2003, but less of 7% of claims. The difference in terms of relative incidence can be explained by the different age structure of the workforce (relatively older in the manufacturing traditional sectors).

year, for multi-employer and single-employer schemes respectively[15]. We have seen in the introduction that the 120,000 workers of United Airlines are likely to have to face a total loss of $3.2 billion, while if the troubled plans of Delta and Northwest workers terminate, their workers will face losses of $2.2 and $2.9 billion respectively.

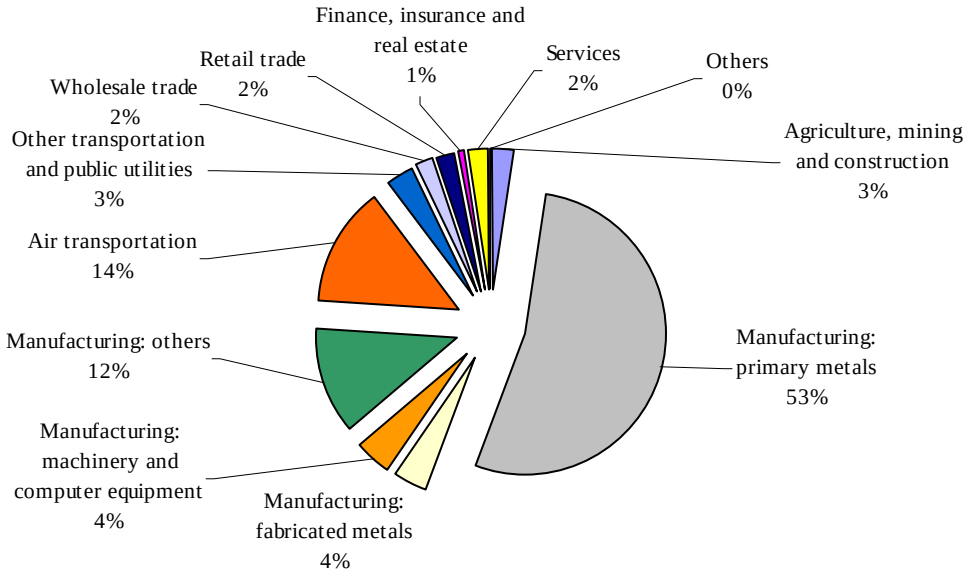
Workers' losses, however, are not limited to the remaining part of accrued liabilities, but also include the being obliged to go without the higher benefits which would have been accrued as a result of further wage rises (as the PBGC only considers ABO termination liabilities and not PBO liabilities) and the loss of the DB mechanism itself for the remaining of their working lives.

Some moral hazard emerges in such a situation, both for workers and firms. Companies that believe they may have financial troubles have an incentive to both contribute as little as possible and to invest their plans' assets in a risky portfolio, because they know that if they default they will not be required to meet their pension obligations. In effect, neither the funding ratios nor the PBGC variable premium depend on the composition and riskiness of a plan's investments and this may further foster opportunistic behavior, some evidence of which Coronado and Liang (2005) find in the data.

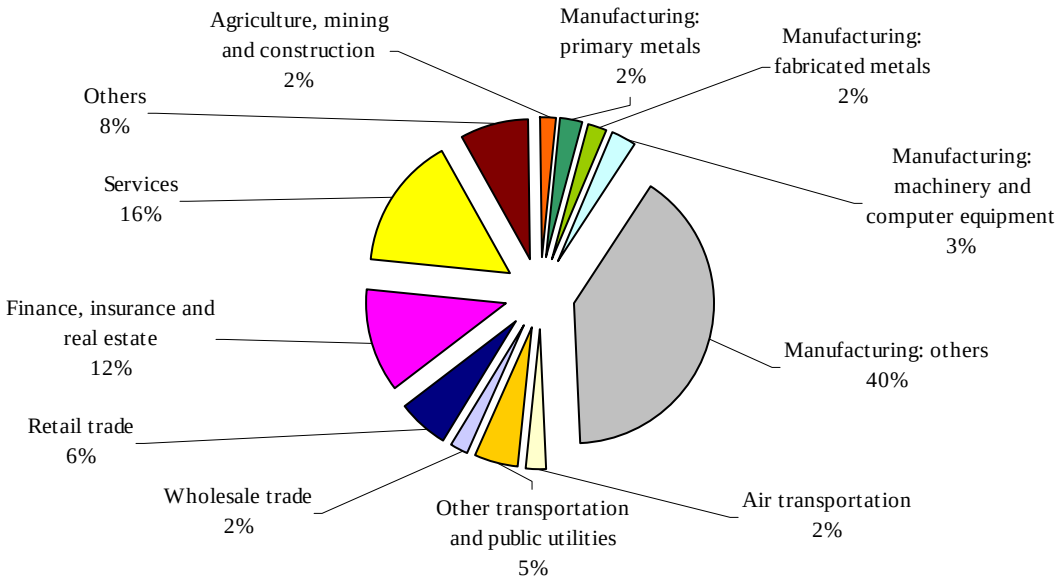
Another incentive to moral hazard exists for both workers and management in financially troubled companies. They may agree to increase pension benefits in lieu of wages, either because in this way the company can dilute the cost in several years, saving on cash, or because workers, expecting the plan will default, want to minimize their losses and increase their claim to the PBGC as much as possible by reaching the guaranteed upper limit (PBGC 2005b). In fact, the current legislation tries to prevent these types of behavior, but it does not seem to be very effective in this regard and, as we will see in Section 5.2 below, this is precisely one issue that the new reform aims to explicitly address.

[15] Which, however, does not mean that 100% of workers' liabilities are guaranteed up to that sum.

Graph 10a - PBGC claims by industry*



Graph 10b - PBGC insured participants by industry*



* 1975-2004. Only single-employer schemes

Source: PBGC: Pension Insurance Data Book 2004 1975-2004

Table 2 - PBGC: Top 10 firms presenting claims
Single employer schemes only; 1975 - 2004

Firm	Number of plans	Years of plans termination	Claims	Vested participants	Average claim per vested participant	% of total claims
			($ millions)		($)	
United Airlines	4	2005	7.094	122.541	57.889	22.7%
Bethlehem Steel	1	2003	3.654	97.015	37.668	11,5%
US Airways	4	2003, 2005	2.862	58.823	48.653	9,0%
LTV Steel	6	2002, 2003, 2004	1.960	80.961	24.205	6,2%
National Steel	7	2003	1.161	35.404	32.793	3,7%
Pan American Air	3	1991, 1992	841	37.485	22.438	2,7%
Weirton Steel	1	2004	690	9.196	75.052	2,2%
TWA	2	2001	668	34.257	19.511	2,1%
Kemper Insurance	2	2005	566	12.221	46.324	1,8%
Kaiser Aluminium	3	2004	566	17.591	32.165	1,8%
Top 10 total	**33**		**20.062**	**505.494**	**39.689**	**63,3%**
All other total	3552		11.646	1.178.762	9.880	36,7%
Total	**3585**		**31.709**	**1.684.256**	**18.826**	**100.0%**

Source: PBGC: Pension Insurance Data Book 2005, Tab. S5.

4.3 The effects on firms and financial markets

Rather than just looking at the legal funding requirements, which determine companies' pension contributions in the short term, the financial world is increasingly interested about the medium and long term impact of pension liabilities on company balance sheets. Funding pension plans could possibly drain resources and affect rating and equity prices. Accordingly, financial analysts and credit rating agencies started to study pension obligations carefully, assessing liabilities in terms of PBOs (thus trying to consider the real benefits the companies will have to pay), although, to minimize arbitrariness, they also normally price assets at market value (which implies a short term perspective)[16].

According to estimates by CSFB (2003, 2005) on the 369 companies belonging to Standard & Poor's 500 (S&P500)[17] that are sponsors of DB pension plans, at least 312 (85% of the total) had an underfunded pension plan at the end of 2003 according PBO

[16] The recent US financial history may explain such choice, as analysts and rating agencies, accused, together with auditing companies, of lax methodology and too light assessment of firms' financial position, want to avoid any arbitrariness.
[17] The S&P500 companies' pension schemes represent a not negligible share of total US DB pension schemes: the value of S&P500 pension schemes' assets in 2003 was the 67% of the value of assets of the DB pension schemes.

calculation, of which 166 (about 45% of the total) were less than 80% funded and 36 (about 10% of the total) less than 60% funded (**Graph 11**). 44 companies were underfunded by over $1 billion and 17 by over $2 billion (there were only 6 in the previous three years).

Total underfunding for S&P500 companies was about $172 billion at the end of 2003, which is just 2.6% of the end of year market capitalization of the 369 companies with DB plans. If this number is small, however, things are more worrying when single companies are considered: in fact, at least 35 had underfunding of more than 15% of their market value in 2003 and 17 were underfunded by more than 25% of the company's capitalization. This means that in the latter case the pension plan may have a claim on over ¼ of the shareholders' stake in the company. The CSFB estimates that in 2004 there were at least eight companies in the same situation.

A large part of underfunding is concentrated in the manufacturing and transportation sectors and in a few big companies, which risk, as others did in the recent past, to have to close their DB plans and to pass assets and pension debt to the PBGC. Underfunding is more widespread (i.e. the percentage of companies with large underfunding in terms of market value on the sector) in the sectors of Consumer Discretionary, Energy, Industrials, Materials and Utilities (**Tab. 3**); this confirms what we have seen above (**Graph 10)** on the sector distribution of the PBGC claims. In particular, underfunding is concentrated in the metal sector (steel, classified by CSFB in Materials) and in the automobile (Consumer Discretionary) and airlines sectors (Industrials).

In 2003, seven companies in the S&P500 accounted for 30% of the total underfunding and five of these were underfunded by more than 50% of their capitalization (Standard & Poor's 2005). According to CSFB (2005), in 2004, in terms of the ratio of underfunding to market value, the worst cases were Delta (underfunding at 940% of market value), Goodyear (168%), Delphi (91%) and Ford (54%, with more than $12 billion of underfunding) (**Tab. 4**).

Another indicator of the potential exposure of a company to pension liabilities is the leverage of DB pension plans, which looks not just at the unfunded part of liabilities, but directly at the entire stock of projected benefit obligations as a ratio to stock market capitalization. In 2003, at least 32 companies (about 9% of those belonging to S&P500

and sponsoring a DB pension plan) had pension plan leverage greater than 1 (i.e. PBOs that exceed their equity market capitalization) and 15 had PBOs that were at least double their market value. CSFB estimates that at least 20 companies had a leverage greater than 1 at the end of 2004 (**Tab.5**).

When plan sponsors are the sole contributors to a plan and the law protects the accrued benefits, companies are obliged to increase contributions. These increased payments may directly affect the cash flow and investments of companies. The pressure on cash flow may have an adverse effect on the stock market value of the sponsor. "*Underfunding is more than a footnote to the financial statements. Pensions, like debts, must be paid if a company is to remain credible. When pension funding falls far enough to mandate contributions, corporations must trim other spending that could have been used to cover new investments, or wages and salaries for new employees*." (Standard and Poor's 2005).

S&P500 companies contributed $73 billion to plans in 2004, nearly the same as in 2003 ($74 billion), on top of the $46 billion they contributed in 2002 (and up from only $14 billion in 2001). The $74 billion of contributions made during 2003 was around 9.1% of total cash flow of the S&P500 companies from operations. CSFB forecasts that 145 companies in 2005 had to make contributions amounting to at least 5% of their trailing five-year average cash flow from operations: of these, 14 companies have contributions greater than 25% of cash flow.

So the size of funding gaps can have a noticeably negative effect on equity prices, as in the case of those companies (like the ones in the automobile and airlines sector) having mature DB schemes that are relatively large compared to the company's own market capitalization. CSFB estimates that 18 companies belonging to S&P500 have experienced an increase in pension costs between 2004 and 2005, which has reduced estimated earnings by at least $0.10 per share. On a per share basis, the increase in pension costs represents more than 5% of the First Call consensus estimates for earnings for at least 6 companies. If companies had been required to adjust their balance sheets to reflect the minimum pension liability in 2002, this would have led to $90 billion in after-tax charges against shareholders' equity, reducing equity by about 30%.

Kwan (2003) tried to assess the potential impact of the extra funding required to cover the pension obligations on capital expenditures for 327 companies in the S&P500 with DB schemes for which the author had data. Again, measuring pension liabilities in terms of PBO (thus overestimating the burden with respect to current funding rules), measuring assets at market value and assuming regaining full funding in 5 years, he finds that the extra burden required to the 264 companies with an underfunded plan would have accounted on average for 31% of capital spending, with a median of 19% and 16 companies for which the extra burden would have been greater than 100%. Thus, for a number of firms the additional contribution could be not negligible compared to their capital expenditure, and pension fund contributions could be traded off against investments.

Another effect of funding gaps is on ratings. Rating agencies were widely criticized in 2001 and 2002 because they were not giving due attention to pension liabilities and they were therefore overlooking difficulties that could hit companies from that quarter. With the much greater attention given to accounting and hidden liabilities after the Enron and WorldCom scandals in 2001 and 2002, they began warning that underfunded amounts in company pension schemes are similar to debt and one should treat differences between PBOs and the fair value of plan assets (i.e. the funding gap) like any other long-term debt obligation of sponsor companies[18]. Standard & Poor's Ratings Service, for instance, has refined certain financial adjustments and ratio definitions to help ensure that ratings on industrial companies fully reflect unfunded DB pension and other postretirement obligations[19].

This change in rating analysis has resulted in several downgrades linked to pension liabilities, which often affect companies in older industries, with an aging workforce, or

[18] For instance, CSFB 2005 proposes:

1. to put pension plan assets on the asset side of the balance sheet and to use PBOs on the liability side;
2. to replace the expected return (used to compute amortization and the value of assets, smoothing for volatility) with the actual return on plan assets and gains and losses on the PBOs;
3. to arrive at the "real" pension cost by recording interest cost and service cost; only the compensation component (service cost) of pension cost remains in the operating income instead of all pension cost.

[19] This change in the practice by rating agencies is spreading worldwide, creating however problems in different institutional settings; for example, traditionally German companies finance their supplementary pension plans on a pay-as-you-go basis and would now see a substantial extra debt appear on their balance sheets. Indeed, the same type of consideration is also affecting accounting standards, with a clear tendency emerging toward reducing the actuary discretionality in the evaluation of both assets and liabilities, as in the case of the IAS19 standard with respect to FAS 87 or of the new UK FRS17 standard.

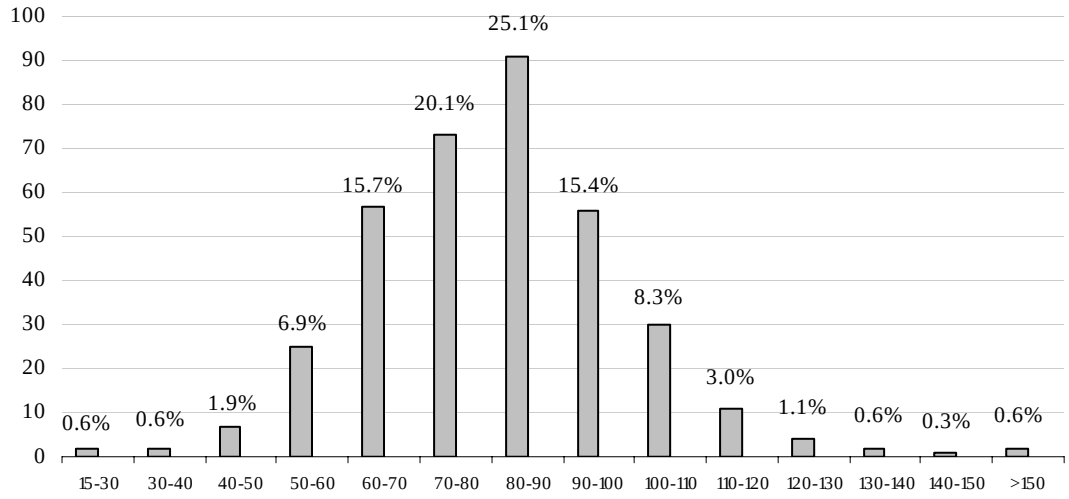
weak cash-flow. According to S&P, the inconsistency of a company's financial profile with the existing rating (after adjusting for unfunded pension obligations) is a sufficient justification for a downgrade. In 2002, S&P lowered the long-term debt ratings on GM mainly because of the poor return on the pension fund and the fact that this would have increased the already large unfunded pension liability; it did this again in May 2005. S&P also lowered Delta Air credit rating in 2004, reflecting the financial damage coming from post retirement liabilities and put under review a non-negligible number of companies.

The possible consequences of the current situation and the proposed measures on financial markets should be taken into account. One outcome is the decline in the number of DB pension funds with a relative increase in DC and hybrid schemes: in fact, given the greater focus on asset and liability and risk management, if large funding deficits persist, additional downgrades could be imminent, as well as increases in fund terminations, a deterrent for the provision of this kind of plans. Moreover, policy changes are increasing the sensitivity of pension funds and their sponsors to market value and shorter-term price movements and this is expected to influence pension fund investment behavior. Consequently, some pension funds could attempt to address funding gaps in the short term by adjusting their asset allocation. Many market analysts believe that regulatory reforms and accounting changes in progress may end up producing a significant reallocation of pension assets from equities into bond[20], as sponsors hunt for ways to reduce funding risks and accounting volatility. If a significant and sudden shift occurred, even if it is quite unlikely given the reluctance of many pension fund mangers to move to bonds while rates remain at perceived low levels, this would affect financial markets and asset prices in the short-term.

[20] Recently, an increasing body of opinion favors a portfolio based primarily on fixed-income securities. Since pension fund's liabilities form a future stream of payment obligation that closely resemble a portfolio of fixed-income obligations, it is believed that a bond portfolio can best provide the certainty that the pension fund will meet its liabilities.

Graph 11 - Distribution of DB pension plans by Funding Ratio

% of the number of S&P500 companies with DB plans, 2003



Source: Reforme computations on CSFB data

Table 3 - Sectoral uderfunding of listed companies

S&P500 companies with underfunding > 15% of market capitalization. End 2003

	number	**incidence (%)***
Consumer Discretionary	7	8.1
Consumer Staples	1	2.9
Energy	4	15.4
Financials	1	1.4
Health Care	1	2.0
Industrials	9	16.7
Information Technology	2	2.6
Materials	5	15.6
Telecommunication Services	0	0.0
Utilities	3	9.4
Others not allocated	2	13.3
Total	**35**	**7.1**

(*) Sector Incidence: number of underfunded companies on the overall number of listed companies in the same sector.

Source: Reforme computation on CSFB and Thomson Financial data.

Table 4 - S&P500 companies with major underfunding
$ billion - 2004 estimate

Company	Underfunding (1)	Market value	Ratio
Ford	12.5	23.1	54%
Exxon	10.5	315.8	3%
GM	10.3	21.5	48%
Boeing	6.9	42.1	16%
Delta	5.8	0.6	940%
IBM	5.7	149.8	4%
Lockheed	4.4	24.3	18%
Delphi	4.3	4.8	91%
UTC	3.8	47.5	8%
Raytheon	3.8	16.6	23%
Du Pont	3.5	42.8	8%
Goodyear	2.9	1.7	168%
Total	**74.4**	**690.6**	**11%**
S&P500 (2)	**184.8**		

(1) Value of pension benefit obligations (PBO)
(2) 369 companies sponsoring DB plans
Source: Credit Suisse First Boston, "The Magic of Pension Accounting, Part III", Feb 05

5. Searching for a way out

Too many degrees of freedom allowed by the rules on funding has caused a large gap to emerge between liabilities and assets. The underfunding crisis, however, unveiled the systematic trade-off between guaranteeing adequate funding levels and containing the burden of extra contributions for companies which compete in an environment where typically younger companies with DC plans (or no pension scheme at all) face lighter costs.

The solutions envisaged by policymakers do not seem to indicate a clear way out of this trade-off. In the recent past the legislative intervention aimed at the short term goal of avoiding a too big and too fast rise in contributions. In a medium term perspective, the intervention envisaged by the 2006 Pension Protection Act approved by the Parliament after a long debate and signed by the US President on August 2006 aims at achieving more effective funding ratios and forces higher contributions from the sponsors, still leaving however many open issues which may undermine its effectiveness and require further intervention in the future.

In fact, underlying the debate is the hope that a steadily rising stock market and a return of interest rates to levels more in line with the past will offer companies substantial relief, while the shift from DB to DC schemes should reduce the volatility of contributions, marking, however, perhaps the end of the private arrangement by which the US tried to offer a direct answer to the demand of individuals to maintain their living standards after retirement.

5.1 Short term intervention

The main tool used to address the underfunding issue in the short run has been to increase the discount rate used to calculate pension liabilities and funding ratios.

As already mentioned, from 1987 to 2002, ERISA's Deficit Reduction Rules required DB pension plans to use a discount rate not higher than 105% of the weighted four-year average of the returns on 30-year US Treasury bonds. However, these bonds have not been issued regularly anymore in recent years[21], while the interest rate on existing bonds has been falling and this has substantially increased the value of pension debt.

The US Government and the Parliament intervened both in 2002 and 2004 with temporary measures, allowing a higher discount rate to be used until the end of 2005 than that prescribed by the ERISA, thus reducing firms' contributions. In 2002-2003 Congress allowed pension plans to use up to 120%, instead of 105%, of the 30-year Treasury bond rate average itself. Later on, a new stopgap measure for 2004-2005 was approved. This allowed plan sponsors to compute funding requirements using a discount rate consisting of an average of the return of three single A or better rated corporate bond indices with maturity longer than 10 years, averaged over the previous four years, with higher weightings for the more recent years. It is estimated that this last measure has offered companies (temporary) savings on pension contributions of as much as $40 billion per year. The 2006 Pension Protection Act extended such

[21] The issuance of 30-year bonds was suspended on 31 October 2001, on the grounds the "long bond" did not met the cash needs of the Treasury (at the time the federal budget was in surplus) and that the decision would save taxpayers' money reducing the borrowing costs. In August 2005 the decision to resume the issuance was taken (pension-related demand for longer term maturities being one of the reasons), with the first "new" issue in February 2006.

temporary measure to the end of 2007, since when a new discount rate will be used (see below).

Another recurrent proposal - which did not reach final approval - runs along the same lines of reducing and smoothing companies payments and consists of just suspending the Deficit Reduction Contribution for a certain period, which, as seen above in Section 3.1, requires DB schemes whose funding ratio falls below the two thresholds of 80% and 90% to cover the underfunding in 5-7 years maximum. If this rule was suspended, the General Contribution Rules would apply, thus making it possible to smooth the recovery of funding levels over a period as long as 30 years, as seen above. While never approved for the generality of DB schemes sponsors, however, such type of relief has been used for certain sectors, and for example the 2006 Pension Protection Act set special rules for commercial passenger airlines, leaving them more time (up to 17 years) to recover from underfunding.

Clearly, all stopgap interventions have had a twofold aim: on the one hand allowing time to design more structural solutions; on the other to wait for changes on financial markets, the hope being that their performances would have contributed to solve at least part of the problem.

However, the increased degrees of freedom left to companies has also raised systematic risks and, as the financial markets have not performed well enough, brought underfunding to its current record level. Indeed, as CSFB (2003, p. 7) concludes: "*These companies may get a break for the next two years if Congress provides pension funding relief. They must then hope that the stock markets go up and interest rates rise to bail out their plans. Otherwise, some companies may be hit with pension contribution requirements in 2006 which they can't afford. It must be remembered that the relief does not change the retirement benefits that will eventually be paid to employees; it does, however, delay the timing of when those benefits must be funded*".

5.2 The 2006 Pension Protection Act: effectiveness vs. preservation of the system

After a long debate through 2005 and 2006, which has seen both the Senate and the House to approve different bills on the matter while the US President was proposing its own and threatening a veto on the others, a comprehensive reform was finally approved and signed into law on August 17th, 2006.

The 586 pages of the 2006 Pension Protection Act review funding assessment and underfunding recovery rules for both single-employer and multi-employer DB schemes, while also intervening on DC schemes, abolishing barriers to the automatic enrollment of workers by the employers and improving information flows to workers.

While it is too early for a comprehensive assessment of the law, two broad elements seem to emerge from the picture. The first is that the new bill seems to endorse a view of the DB as the "old" system, and of the DC as the "new" one (particularly the 401k schemes and the individual retirement accounts - IRAs); in this sense it appears that the bill aims mostly at securing workers rights and PBGC solvency through adequate funding of existing schemes in the DB segment, while focusing on promoting retirement provision through DC schemes instead. The second element that emerges is that while the bill is very long and prescriptive, stating in details new general rules on funding, their application is delayed till 2008, while several exceptions to the general rule or special provision may end up leaving still room of manoeuvre on firms' contribution duties.

In effects the degree of tightness of the new rules has been a topic on which the different actors of the legislative process (the House, the Senate, the President) have offered different views. This not only because of the above mentioned trade-off between effectiveness in eliminating the systemic underfunding of the DB system and restoring PBGC to financial health – which implies tight rules – on one hand and burdening firms with higher contributions on the other. But also because the more the measures are onerous the less incentive companies have to offer DB schemes, which undermines the preservation of DB pension provisions themselves. Indeed, as said above, it seems that the new law considers somehow too expensive or to difficult to maintain a DB system, and rather envisages a private pension system that will center on the DC principle.

Considering in more details the new rules on single-employer DB schemes, in the remaining part of this section we briefly consider the reform of funding rules (the funding requirement, the discount rate used to assess the liabilities, the method of measuring assets), the increase in tax deduction thresholds for company contributions, the credit balance system, the tightening of rules to avoid moral hazard and the rise of the insurance premium that DB schemes pay to the PBGC.

Funding rules: funding targets

The deficit reduction and general contribution rules are substituted by a unique minimum required contribution, which is the contribution needed to reach a funding target of 100% (previously, as said in section 3 above, the main funding target was 90%), were the funding target is given by the present value of all benefits expected to accrue or to be earned during the year, augmented by the amortization of previous funding shortfall non "waived" by the regulator. The period allowed for amortization unfunded pension liabilities will be 7 years, while, as said above, the previous legislation allowed from 5 up to 30 years, depending on the source of underfunding.

In any case, a difference similar to that between the deficit reduction and the general contribution emerges in the definition of "funding target", which is different if a plan is considered "at risk". While in normal conditions the funding status and the minimum required contribution can be calculated by using reasonable best actuarial estimates on retirement age and annuitization choices, if the plan is "at risk", the assumption has to be used that every worker retires as soon as entitled to and chooses the most valuable between annuitizing or getting a lump-sum. Thus liabilities are higher under the "at risk" status, which implies higher minimum contributions are required. The "at risk" status applies if a scheme results funded below 80% according to the normal rule or below 70% according to the stricter rules under the "at risk" status itself (although it will be so only after a transition period ending in 2010 and special rules, less tight, applies to the car sector).

Funding rules: the discount rate

As already said, the bill confirms for 2006 and 2007 the temporary measure which changed the discount rate used to measure liabilities, replacing the 30-year Treasury

bond rate with the average of the rates of interest on long-term investment-grade corporate bonds in the previous four-year period.

In 2008 and 2009 an average of the above rate and the new ones will apply. Since 2010 the new rates will have to be used, which are determined using three interest rates ("segment" rates), each of which applies to benefit payments expected to be made from the plan during a certain period. The first segment rate applies to benefits reasonably determined to be payable during the initial five-year period; the second segment rate applies to benefits reasonably determined to be payable during the 15-year period following the initial five-year period; and the third segment rate applies to benefits reasonably determined to be payable later on. Each segment rate is a single interest rate determined monthly by the Secretary of the Treasury on the basis of a corporate bond yield curve, taking into account only the portion of the yield curve based on corporate bonds maturing during the particular segment rate period. The corporate bond yield curve used reflects the average in the previous 24-month period of yields on investment grade corporate bonds with varying maturities and that are in the top three quality levels available.

Funding rules: measuring assets

While stating the general principle that valuation of assets should be based on fair market value, the new law continue allowing averaging, although on a shorter period with respect to the current 5-years allowed: smoothing will be permitted over the last two years and only between a range going from 90% to 110% of the fair market value.

Tax treatment of contributions

The bill increases the tax deduction threshold for 2006 and 2007, allowing sponsors to fund up to 150% of ABOs. Since 2008, the threshold will be the contribution needed to reach the greater of 100% of ABOs (instead of the current 90%) or 100% of PBOs *plus* 50% of ABOs. Moreover, to this aim the calculation of ABOs can be done as if the scheme was "at risk" (as defined above), which further increases the tax deduction threshold.

The credit balance system

As said in Section 4.1, the credit balance system allows firms to use excess contributions made in the past (possibly merely due to a single year better-than-expected performance of financial markets) to compensate for contributions currently due and it has been one of the tools that allowed underfunding to accumulate and "contribution holidays" to be taken even by sponsors of schemes that had to be rescued by the PBGC immediately afterwards. The new law does not prohibit the use of credit balances, and rather aims at incentivating extra-funding from the sponsor, which may be used when needed to fulfill required contributions. Accordingly, when a scheme is funded at least at 80% according to the normal rule, it can still use credit balance till the exhaustion of due contributions (but not to such an extent that the actual contributions become negative). Alternatively, it can carryover the credit balance, but in this case the prefunding is not evaluate among the assets, to avoid a double use of excess funding (to fulfill funding ratio thresholds and to reduce contribution).

Moral hazard and benefit limitations

As seen in Section 4.2, in a framework of bargaining between employers and unions, some evidence emerged that parties often transfer part of the costs of the agreement on the DB scheme. On the one hand, as long as the General Contribution Rule applies, the associated liabilities can be covered over 30 years, as seen in Section 3.1. On the other hand, when a firms expects to default on its DB scheme, it has an incentive to transfer obligations to it that it will probably not have to actually pay for, while unions, if they know a scheme is not going to survive, have an equal incentive to increase liabilities as much as possible, to reduce workers' losses when the PBGC rescues the plan.

To avoid these types of behavior, the law required that if a sponsor wished to amend its plan and increase benefits, it should have not filed for bankruptcy (Chapter 11) nor the plan's funding ratio should have been below 60%, otherwise the new liabilities should have been immediately funded and secured. Apart from reducing – as seen – the period in which unfunded liabilities have to covered, the new rules sets such level at 80%, while also stating that when funding goes below 60% contingent event benefits (like those that could be recognized in case of a plant shutdown) cannot be paid, while all new benefit accrual must be frozen.

The PBGC premium

The reform of the PBGC premium was considered a crucial element in order to guarantee its solvency and as such has been anticipated in the 2005 Budget Reduction Act. Accordingly (see **Tab. 2** above), the flat rate premium has been increased from $19 to $30 per participant for single-employer plans and from $2.6 to $8 per participant for multi-employer plans, this value being now indexed to average wage growth. For single-employer schemes a variable rate premium (VRP) adds, equal to 9‰ of unfunded *vested* current liability, and a further premium, equal to $1250 per participant per three years, for schemes that terminate (thus terminating a plan becomes less convenient for the sponsor). On this regards, the 2006 Pension Protection Act only makes permanent this last provision, which initially should have expired in 2010.

5.3 ... still an open issue

The short term measures introduced for the period 2002-2005 aimed therefore at containing the extra burden on sponsors' pension contributions, without explicitly dealing with the cause of the underfunding problems and without affecting the size of liabilities.

The stronger measures introduced in 2006 seem to recognize the need for tighter funding rules and therefore for an increase in contributions, however, they are faced with the need not to be too tight, to avoid overburdening sponsors which are already trying to renegotiate their pension obligations, which means closing plans to new entrants or even defaulting on their pension obligations, shifting the burden onto the PBGC and onto workers. Consequently, the maintenance of a higher discount rate than the 30-year Treasury bond interest rate allows sponsors to automatically improve their funding ratios, while at the same time saving when they meet their obligations: in fact, a high proportion of benefits are paid as a lump-sum at retirement, that is computed discounting a stream of future payments with a higher discount rate. At the same time, many degrees of freedom in the valuation of a pension scheme's assets and liabilities would remain, which means that smoothing the valuation of assets will still be possible,

while liabilities will continue to be valued on the basis of ABO rather than PBO. Furthermore, exceptions are explicitly set for the most troubled sectors.

The new bill will probably determine a certain rise in contributions in the year to come, which, however could be contained if, as is likely in the current US framework, stock markets continue on a positive, although not spectacular, trend, while long term rates will finally start to respond to the numerous increases in the Federal Fund rate since 2005.

The possible recovery, however, may turn out to be only partial, as the approaching retirement of an increasing proportion of DB scheme members may require sponsors to finance the actual disbursement of benefits. In this sense, as already mentioned, the underfunding problem has more structural causes that cannot be easily solved.

On this respect, as said, the new law seems to back the trend in favor of DC rather than DB schemes, aiming at securing the solvency of already established DB schemes on one side, but only envisaging for the future a DC type of provision on the other.

6. Conclusions

Many defined benefit private pension schemes in the United States are today seriously underfunded, with a dramatic U-turn with respect to the situation prevailing at the end of the '90s, and several defaulted in the last few years.

A bunch of factors contributes to explain this reversal of fortune. On the financial markets front, a combination of falling stock markets was followed by a prolonged period of historically low interest rates. On the economic front, the difficulties to compete in a changing domestic and international environment brought several big "old economy" companies, sponsoring large and relatively generous defined benefit plans, to go broke or near bankruptcy; other found their pension costs too high and less predictable with respect to younger and possibly foreign companies, with defined contribution or no pension scheme at all. On the regulation front, the rules enacted since the mid ‘80s failed to tackle the impact that the aging of the baby-boom generations was having on the plans and, on the contrary, allowed the buildup of an increasing amount of “legal” underfunding.

If compared to the overall dimension of DB plans pension liabilities, or to the market value of the sponsoring companies, the size of total underfunding is small. However its impact and potential consequences are not.

As a consequence of underfunding, pension contributions had (or will have) to increase, impacting negatively on the sponsor companies' balance sheets, when not on their financial soundness. The pressure on cash flows may also negatively affect sponsors' equity prices. In addition, for a number of firms the additional contributions needed to fill the funding gap are not negligible compared to their capital expenditure: funding pension obligations could thus translate in a drag on investment and hence on future growth. As a further consequence, the underfunding issue is affecting accounting standards and company ratings, as financial analysts are paying greater attention to pension liabilities and refine their methodology to better reflect unfunded pension obligations.

The consequences of underfunding could be particularly harsh on some industry or sector. In fact, the problem is concentrated in a few big companies in the traditional sectors of the economy (manufacturing, transportation), which risk to have to close their DB schemes and to pass assets and liabilities to the PBGC, which ensure DB schemes.

In the recent past the extent of underfunding for many schemes was such that they had to be shut down. As a result, the PBGC has seen its financial position deteriorating sharply; and in the next years its financial viability is still at risk

But the PBGC is not alone in incurring costs and facing risks: workers are hit more directly, given the statutory limits to PBGC intervention. For a number of them, the underfunding crisis has meant and will mean a loss of pension rights.

The effectiveness of the structural intervention aimed at addressing the crisis, finalized in August 2006, will have to be assessed in the coming years. However, the 2006 bill had to move in a narrow path, a trade-off existing between securing workers' pension rights and containing the costs that companies face to fund their DB plans.

While many still hope that the underfunding problem will be swept away by the same forces that caused it, namely a continuation in the current positive trend of stock markets and an eventual rise in interest rates, the declining appeal of DB schemes is not

as like to be reversed, though, and the new law does not seem to be willing to contrast the shift towards DC plans.

The increase in contribution burden for sponsor companies, in fact, is discouraging them to offer DB schemes to their employees; the substitution of DB with DC schemes progressively offloads the financial risk to the workers. As a consequence, while DB schemes remain the main type of private scheme for current pensioners and workers close to retirement, younger workers are increasingly offered only DC or individual schemes. The underfunding crisis is clearly accelerating this tendency and it seems unlikely that the US private DB schemes will see any revival soon.

References

Board of Governors of the Federal Reserve System (various years): *Flows of Funds Accounts of the United States*, Washington DC.

Confederation of British Industry (2003): *Focus on investment – The impact of pension deficits*, London.

Coronado J., Liang N. (2005): *The influence of the PBGC insurance on pension fund finances.* "Pension Research Council WP", The Wharton School, University of Pennsylvania.

Credit Suisse First Boston (2003): *The Magic of Pension Accounting, Part II*, October.

Credit Suisse First Boston (2005): *The Magic of Pension Accounting, Part III*, February.

Government Accountability Office of the US (2005): *Private pensions – Recent experiences of large defined benefit plans illustrate weaknesses in funding rules.* GAO Highlights, May 2005.

IMF (2003): *Underfunding of corporate pension plans: macroeconomic and policy implications.* In: "US: selected issues", Washington DC.

IMF (2004): *Risk management and the pension fund industry.* Global Financial Stability Report, chapter III, Washington DC.

Jin L., Merton R. C., Bodie Z. (2004): *Do a Firm's Equity Returns Reflect the Risks of Its Pension Plan?*, Pension Institute Discussion Paper PI-0501

Kwan S. (2003): *Underfunding of private pension plans,* "FRBSF Economic Letters", n. 16, Federal Reserve Bank of San Francisco

Lane Clark & Peacock (2004) *Accounting for pensions*, London.

OECD (2005a): *Report on funding rules and actuarial methods.* In: "Benefit security in occupational pension plans", "Private Pension Series" n. 7, Paris.

OECD (2005b): *Corporate pension fund liabilities and funding gaps*. "Financial Market Trends", n. 88, March, pp. 69 ss., Paris.

PBGC (Pension Benefit Guarantee Corporation) (2002, 2003a, 2004, 2005a): *Performance and accountability report for the fiscal year*, Washington DC.

PBGC (2003b): *Testimony of S. Kandarian, Executive director of Pension Benefit Guarantee Corporation before the Special Committee on Aging of the US Senate, October 14, 2003,* Washington DC.

PBGC (2005b): *Testimony of Bradley D. Belt, Executive director of Pension Benefit Guarantee Corporation before Committee on Budget of the US Senate, June 15, 2005*, Washington DC.

PBGC (2005c): *Testimony of Bradley D. Belt, Executive director of Pension Benefit Guarantee Corporation before the Subcommittee on Aviation of the US House of Representatives, June 22, 2005,* Washington DC.

PBGC (2005d): *The Impact of Pension Reform Proposals on Claims against the Pension Insurance Program, Losses to Participants, and Contributions*, white paper, October 26, 2005

Pension Commission (2004, 2005), *Report of the pensions commission*, The Stationary Office, London.

Schieber S., Shoven J. (1994): *The consequences of population aging on private pension fund saving and asset markets*, NBER WP no. 4665.

Schieber S. (2001): *The impact of aging population on private pension funds. Presentation at the International Pension Seminar, Brighton, UK, 6 June 2001*, mimeo.

Standard and Poor's (2005): *S&P 500 2004 Pension Status Report*, July

US Department of Labor Pension and Welfare Benefits Administration (2004): *Abstract of 1999 Form 5500 Annual Reports*, "Private Pension Plan Bulletin" n. 12, 2004.