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Reforming American Public-Sector Pension Plans: Truths and Consequences

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Most public-sector pension plans in the United States provide quite generous defined benefits. Long-term projections show that full payment of these promises threatens the finances of many state and local employers, which implies that taxes will have to be increased or pensions and/or other public expenditures reduced. This article analyzes the effectiveness of measures aimed at improving the sustainability of these plans. We consider the impact of contribution increases, benefit reductions, and adjustments in the pension fund's investment strategy. Since a pension fund can be seen as a zero-sum game, these interventions imply value redistributions among current and future plan participants and current and future tax payers. We use the value-based asset-liability management (ALM) method to estimate the value of those transfers. These imply massive value redistributions from taxpayers to plan participants that could exceed 20% of American GDP. Hence, plan sustainability may be achieved only through either substantially higher contributions or lower benefits.

Keywords: Amortization Period, Conditional Indexation, Funding Ratio, GASB Standards, Pension Fund, Value-Based ALM

How Large Is the Underfunding Problem?

Population aging is putting retirement provision under financial pressure. As a result, in the past decades the United States has witnessed a trend away from defined benefit (DB) towards defined contribution (DC) pension plans. The public-sector pension plans that manage the pensions of state civil servants, however, are an exception to this trend: these plans still largely operate on a DB basis, even though it is clear that the benefits promised to their participants cannot be honored absent drastic measures to reduce the generosity of the plans or raise the financial support from taxpayers. This article explores the degree of underfunding of American state pension funds as well as the effectiveness of various measures to alleviate this potential burden on American taxpayers.

Table 1 summarizes the funding status of American public-sector pension plans in 2012 (Munnell et al. 2013), based on a sample of 109 state plans and 17 locally administered plans.¹ The average funding ratio (assets / liabilities) is 73%. The funding ratios are reported on the basis of GASB standards that prescribe that assets be reported on an actuarially smoothed basis, while the discount rate for the liabilities is typically set at around 8%, reflecting the expected long-term investment return on assets.

There is an ongoing debate on how funding ratios should be measured, and what the appropriate funding target should be (see, e.g., D'Arcy, Dulebohn, and Oh 1999; Bohn 2011; Lucas and Zeldes 2009; Brown, Clark, and Rauh 2011). Brown et al. (2011) assume that adequate funding means 100% funding. The GASB standards have been criticized by financial economists (Novy-Marx and Rauh 2009; Bader and Gold 2003) who argue that future streams of benefit payments should be discounted at a rate reflecting their degree of riskiness. As state and local pension benefits are protected under most state laws, these payments can be seen as guaranteed, which implies that future benefits must be discounted at the risk-free interest rate. This discounting would lead to a severe fall (around 30 percentage points) in the already low average funding ratio of state and local plans.

Table 1: Distribution of Funding Ratios of Public Plans, 2012

Funding Ratio (%)	Proportion of Plans (%)
≤40	1.6
40–<60	20.6
60–<80	45.2
80–<100	27.0
≥100	5.6
73.3	Average

Source: Munnell et al. (2013)

Policy Measures to Improve Financial Sustainability

Higher funding ratios can be achieved in three ways: higher contributions, lower benefits, and higher investment returns. [Novy-Marx and Rauh \(2014a\)](#) explore how much contributions would need to be raised to reach full funding in 30 years' time, computing a necessary increase in public-sector employee contributions on the order of 23% of pay. The option of reducing benefits has long been seen as unfeasible, because in many states public pensions are interpreted as hard contractual obligations, protected by civil law and state constitutions ([Monahan 2012](#)); recently, however, several states have been successful in scaling back the generosity of pensions. Several plans have relaxed the guaranteed character of benefits by suspending the cost-of-living adjustment while still paying out accrued pension promises as defined by the plan. Some plans have enacted benefit cuts, as for example for city employees in Detroit.

[Novy-Marx and Rauh \(2014b\)](#) have explored performance-linked indexation rules as an alternative to automatic cost-of-living adjustments (COLA); they also suggest implementing the conditional indexation rules of Dutch pension plans, which link indexation to the financial position as measured by the funding ratio ([Beetsma and Buccioli 2011](#); [Ponds and Van Riel 2009](#)). [Shnitser \(2013\)](#) stresses that simply scaling back benefits or imposing higher contribution rates will not be enough, claiming that institutional design must be reframed to practices and rules that have proved successful in promoting funding discipline.

A third route proposed to resolve funding deficits is to increase investment returns. This option seems to be in use already, as many American public-sector pension funds have higher equity exposures than pension funds outside the United States ([Andonov, Bauer, and Cremers 2013](#); [OECD 2011](#)).

The Value-Based ALM Method

We assess the long-term financial sustainability of the American public pension sector using the value-based asset-liability management (ALM) method, which involves rewriting a pension plan in terms of embedded options held by the fund's stakeholders (in this case, current and future plan members and taxpayers). By providing a market-based valuation of all cash flows associated with the pension contract, value-based ALM decomposes the consequences of policy interventions for the different stakeholders. Changes in the fair values of the embedded options reveal value transfers between the stakeholders. Policy changes are always a zero-sum game, such that the total value of the contract to all stakeholders together is unchanged and policy changes can only shift value

among groups of stakeholders. To the best of our knowledge, this is the first application of value-based ALM to the study of reform-induced generational redistribution within American state and local pension funds.

The value-based ALM approach has its roots in pioneering work by [Sharpe \(1976\)](#) and [Treyner \(1977\)](#) in using derivative pricing to value contingent claims within pension funds (more recent applications of derivative pricing to pension plans include [Blake 1998](#); [Chapman, Gordon, and Speed 2001](#); [Ponds 2003](#); [Bader and Gold 2007](#); [Hoevenaars and Ponds 2008](#); and [Hoevenaars, Kocken, and Ponds 2009](#)). [Biggs \(2010\)](#) also uses an option-based approach, but only to value the market price of pension liabilities of American state pension plans; he does not discuss reform plans and the resulting value redistribution among stakeholders. Value-based ALM has been used by the Netherlands Bureau of Economic Policy Analysis ([CPB 2012](#)) to investigate the generational fairness of various Dutch pension reform plans.

Classic ALM studies use economic models to produce stochastic simulations of returns on asset classes and other relevant economic data, such as inflation. Scenario analyses result in probability distributions for the key pension plan variables. Sensitivity analysis is used to explore specific policy variants with respect to asset mix, contribution policy, and indexation rules; policy variants are evaluated in terms of expected values and relevant risk measures for key variables (e.g., funding ratio, contribution rate, or indexation rate). Value-based ALM complements classic ALM, as the value-based approach assigns a market value to the contingent claims of the various stakeholders. By shifting from the baseline plan to another plan formulation, we can estimate the magnitude of the value shifts across various stakeholders.

A Representative American Public-Sector Pension Plan

In order to use the value-based ALM method to assess various policy reform options for American state and local pension plans, we created a single pension plan representing the aggregate public pension plan sector in the United States, which reflects the most common plan features in the sector as captured in the Public Plans Database (PPD) of the Center for Retirement Research at Boston College. We use the data from 2010, the last year for which all the required data are reported.

The initial size of the plan participant population in 2010 is 24 million. As the database does not provide information on the composition of the age cohorts, we have constructed the composition of the participant structure from the current American population and the survival probabilities from the Society of Actuaries (SOA) Life Tables. The horizon of our

projections is 75 years. The inflow of new entrants after the twenty-fifth year (i.e., cohorts not born yet) is assumed to follow the trend in the number of new entrants in the first 25 years, based on the cohorts aged 25 and younger in 2010 and their survival probabilities.

Our representative plan is a final-pay plan with a career wage-age profile that is based on the United States and adapted from [Buccioli \(2012\)](#). The accrual rate for each year of service is 2%. The first benefit payment is based on the average of wage levels for the last three working years and on years of service over the participant’s full career. Individuals enter the labor market at age 25 and retire at age 65, so a full career translates to 40 working years.

Valuation of pension fund assets and liabilities follows the GASB standards, including the valuation of liabilities with the assumed rate of return of 8%. The value of total liabilities in 2010, based on the entry-age normal costing (EAN) method,² is calibrated by changing the absolute wage levels to match the US\$3.4 trillion level of liabilities reported in the PPD. The funding ratio is 75%, and the assets under management total US\$2.8 trillion.

The actual contribution is set to 100% of the normal cost (EAN method) plus 50% of the required amortization payment in the case of a funding deficit. The amortization payment is determined by spreading the unfunded liability amount in equal annual payments over the next 30 years. In the case of a funding surplus, the required amortization payment is fixed at zero, so that the total contribution cannot fall below the normal cost level (one-sided policy). The employee pays a fixed 6% of his or her salary, while the employer pays the remainder of the required contribution.

Possible Plan Reforms

We consider several variations on the baseline settings to explore how different policy changes affect the contract values of the various stakeholders. This gives us insights into the effectiveness of different measures in increasing the financial sustainability of the pension plan, as well as the impact of these policy changes on the value of the various stakeholders’ contingent claims. We consider three groups of measures, which are summarized in [Table 2](#). The baseline plan is referred to as Plan 0.0.

1. **Reform Plans 1.1–1.4** address variants in the contribution rate. Plans 1.1 and 1.2 vary the fraction of the required amortization payment actually paid; Plan 1.3 shortens the period over which the amortization payment is spread; and Plan 1.4 doubles participants’ contribution payment (from 6% to 12%), leaving the total contribution unchanged.

2. **Reform Plans 2.1 and 2.2** address variants in the degree of indexation.³ Plan 2.1 halves indexation when CPI inflation is positive. Under Plan 2.2, indexation is conditional on the funding ratio in a linear way: when CPI inflation is positive, the degree of indexation is set at zero for funding ratios below 50% and increases linearly with the funding ratio for funding ratios $\geq 50\%$. A funding ratio above 100% implies more than full indexation. This conditional indexation method closely mirrors the way in which most Dutch pension funds index their pension entitlements.
3. **Reform Plans 3.1 and 3.2** address the composition of the fund’s asset portfolio, which we vary from 0% to 100% stocks. The baseline plan composition is 50% stocks and 50% bonds.

Table 2: Summary of Alternative Reform Plans

Reform Plan	Description
0.0	Baseline
Contribution	
1.1	0% amortization paid
1.2	100% amortization paid
1.3	Amortization spread over 10 years
1.4	Participants’ contribution rate doubled to 12%
Indexation	
2.1	Indexation half CPI
2.2	Conditional indexation
Portfolio Composition	
3.1	100% stocks
3.2	0% stocks

ALM Scenarios and Classic ALM Results

We evaluate the policy choices over 75 years, such that at the end current stakeholders will have been replaced in full by new stakeholders. The ALM scenarios are calibrated to data from the United States. The economy features an annual average stock return of 11.7%, an average 10-year Treasury bond return of 6.3%, nominal wage growth of 5.7%, and price inflation of 3.7%; these figures are averages of all numbers generated for all the scenarios (for more details see [Lekniute et al. 2014](#)).⁴

We first discuss the results of our baseline plan settings, which reflect current practices of American state pension plans. [Tables 3](#) and [4](#) show the funding ratio (FR); the pension result (PR), defined as the ratio of cumulative granted indexation to cumulative 100% price indexation; and the total contribution rate (c) for the baseline plan (column 2) and the various reforms. The long-term projections show a large spread in

the development of the funding ratio in the 0.0 base case. The median funding ratio (initially 75%) falls to 69% in 25 years; it recovers slightly, to 79%, in 75 years, but there is a significant probability of extremely low funding ratios. In the 5% worst scenarios, the assets are completely depleted after 75 years. The increasing underfunding leads to an increase in the contribution rate, but this increase is too slow and too small to counteract the trend toward underfunding.

Reform Plans (RP) 1.1 and 1.2 explore variations in the amortization effort. The extreme case of requesting no amortization premium at all, RP 1.1, will lead to a high probability of default, which would effectively turn the plan into a pay-as-you-go plan. RP 1.2, which fully recognizes the amortization burden, appears to be effective in controlling the solvency position: after an initial fall, the median funding ratio recovers and gradually improves to more than full funding at the end of the horizon. However, the 30-year amortization period is still too long to completely rule out cases of extremely low funding. The amortization effort can also be increased by shortening the amortization period from 30 to 10 years; RP 1.3 shows that this measure can be very effective in limiting the fall of the funding ratio, but it also involves high contributions for extended periods. In RP 1.4, doubling workers' contribution rate from 6% to 12% has no impact on the funding ratio, as employers decrease their contribution load such that the total contribution level does not change, but does worsen the net benefit position of plan participants.

In the variants discussed so far, the benefit side of the contract remains untouched. Variants 2.1 and 2.2, which relax full indexation, lead to higher funding ratios. The plan's sustainability

improves considerably – the median funding ratio in both variants surpasses 100% – but the projected benefits worsen dramatically. After 75 years, the median pension result falls to 25% in RP 2.1, and to 65% in RP 2.2, relative to the pension result of the baseline plan with full indexation.⁵

Finally, we look at variations in the asset allocation. We consider two corner allocations – a pure equity portfolio (RP 3.1) and a pure fixed income portfolio (RP 3.2) – as alternatives to the 50–50 mix in the baseline. The full-equity strategy improves the median and the upside of the funding ratio in the long run, but the probability of default increases as well. The full bond strategy yields no improvement at all relative to the baseline allocation. Overall, the funding ratio is lower and the contributions higher than in the baseline plan.

Thus, the classic ALM results suggest that without intervention, American state and local pension plans will tend to become financially unsustainable. The standard available policy instrument is the amortization component in the contribution rate. Current practices are ineffective in improving current funding ratios: the periodic adjustments in the amortization component are too slow and too small. Speeding up the amortization process and addressing the full amortization burden seem to be effective in avoiding a further fall in funding levels, while relaxing the practice of full indexation also turns out to be effective in improving and controlling sustainability in the longer term.

Conditional indexation of the type employed by Dutch pension funds is particularly effective at compressing the distribution of funding ratios.

Table 3: Classic ALM Results, 25-Year Horizon*

RP	Description	FR			PR			c		
		5%	50%	95%	5%	50%	95%	5%	50%	95%
0.0	baseline	32	69	155	100	100	100	16	20	25
1.1	0% amortization paid	15	56	144	100	100	100	16	16	16
1.2	100% amortization paid	44	79	162	100	100	100	16	21	30
1.3	amortization 10 years	52	87	170	100	100	100	16	21	34
1.4	employee contribution rate doubled	32	69	155	100	100	100	16	20	25
2.1	indexation half CPI	40	81	174	54	67	80	16	18	23
2.2	conditional indexation	45	81	148	41	69	121	16	18	22
3.1	100% stocks	24	109	493	100	100	100	16	16	26
3.2	0% stocks	21	32	49	100	100	100	23	25	26

*Classic ALM results for 5th, 50th, and 95th percentiles of the funding ratio (FR), pension result (PR) and total contribution rate (c). 0.0 = baseline plan; 1.1–1.4 = alternative contribution policies; 2.1, 2.2 = alternative indexation policies; 3.1, 3.2 = alternative investment policies.

Table 4: Classic ALM Results, 75-Year Horizon*

RP	Description	FR			PR			c		
		5%	50%	95%	5%	50%	95%	5%	50%	95%
0.0	baseline	0	79	636	100	100	100	18	21	32
1.1	0% amortization paid	0	0	522	100	100	100	18	18	18
1.2	100% amortization paid	40	127	732	100	100	100	18	18	35
1.3	amortization 10 years	58	156	799	100	100	100	18	18	36
1.4	employee contribution rate doubled	0	79	636	100	100	100	18	21	32
2.1	indexation half CPI	33	171	917	17	25	37	18	18	26
2.2	conditional indexation	48	109	226	11	65	1580	18	18	24
3.1	100% stocks	0	356	7856	100	100	100	18	18	32
3.2	0% stocks	0	0	1	100	100	100	31	32	33

*Classic ALM results for 5th, 50th, and 95th percentiles of the funding ratio (FR), pension result (PR) and total contribution rate (c). 0.0 = baseline plan; 1.1–1.4 = alternative contribution policies; 2.1, 2.2 = alternative indexation policies; 3.1, 3.2 = alternative investment policies.

Value-Based ALM Results

The classic ALM results discussed above give us some interesting information about how effectively alternative policies can strengthen the financial sustainability of our pension fund. Value-based ALM is useful for comparing different reform plans by assigning a market value to the contingent claims of the various stakeholders. Using the value-based ALM approach, we can write the balance sheet of our pension plan as shown in Figure 1.

Figure 1: A DB Plan Balance Sheet

A_0	V_0^P
V_0^E	V_0^R

The left side of the balance sheet states the initial assets of the pension plan (A_0) and the present value of all employer/tax payer contributions (V_0^E) paid over the 75 years of evaluation. On the right side we see the present value of the net benefit to participants (V_0^P), which consists of net benefits received over the evaluation horizon plus pension rights at the end of the evaluation horizon that were accrued in exchange for the contributions paid. What remains is the present value of the

plan residue (V_0^R), which is the difference between the present value of the final assets at the end of the evaluation horizon and the present value of participants' final pension rights. By shifting from the baseline plan to another plan, we can see the magnitude of the shifts in plan values across the various stakeholders.

Reform is a zero-sum game, in value terms, across the fund's stakeholders:

$$\Delta V_0^P + \Delta V_0^E + \Delta V_0^R = 0$$

$\Delta V_0 \equiv V_0 - V_0^*$ is the change in value of the new plan V_0 compared to the value in the baseline V_0^* . For example, if taxpayer contributions to the pension fund increase, then the value of the residue, the value of the net benefits to the participants, or both must increase. The initial assets from the balance sheet do not appear in this expression, as we start with the same initial asset value under all pension plan alternatives; the change in the value of the initial assets, therefore, is always zero. Table 5 shows how changing the policy from baseline (Plan 0.0) to RPs 1.1–3.2 changes the results for future plan participants ($\Delta V^{P,Y}$), current plan participants ($\Delta V^{P,O}$), future taxpayers ($\Delta V^{E,Y}$), current taxpayers ($\Delta V^{E,O}$), and the residue of the pension fund (ΔV^R), where superscripts Y and O represent new (young) and current (old) participants respectively. Effects are reported in billions of 2010 US dollars; for each stakeholder, positive numbers indicate an

Table 5: Value-Based ALM Results (US\$ billion)

Case	Description	$\Delta V_0^{P,Y}$	$\Delta V_0^{P,O}$	$\Delta V_0^{E,Y}$	$\Delta V_0^{E,O}$	ΔV_0^R
Contribution						
1.1	0% amortization paid	0	0	-394	638	-217
1.2	100% amortization paid	0	0	-1427	-1283	2676
1.3	Amortization 10 years	0	0	-2682	-2224	4828
1.4	Part. contr. rate doubled	-3335	-1105	2765	1675	0
Indexation						
2.1	Indexation half CPI	-2453	-3065	2434	527	2570
2.2	Conditional indexation	-3386	-4605	3368	778	3871
Portfolio composition						
3.1	100% stocks	0	0	-250	-132	359
3.2	0% stocks	0	0	112	71	-164

Table rows do not add up to exactly zero because of the limited number of stochastic runs in the valuation procedure.

increase and negative numbers a decrease in value. Under RPs 1.1–1.3, neither contributions by plan participants nor indexation rules changes, so plan participants see no changes in their value claims: $\Delta V_0^{P,Y} = \Delta V_0^{P,O} = 0$. A reduction in the amortization payment (RP 1.1) benefits current taxpayers, who see the amortization contribution rate fall. The value of the final residue falls, in line with the expected deterioration of the funding ratio over time; this also has an effect on the future cohorts of taxpayers, who must cover the deficit with employer support payments if assets are depleted. An increase in the amortization payment (RP 1.2) means higher contribution payments by taxpayers, so both young and old taxpayers experience a loss of value. Similarly, under RP 1.3, which shortens the amortization period, the residue value improves, but at the cost of higher contributions by taxpayers, who therefore see the value of their stake in the pension arrangement fall. Doubling participants' contribution rate reduces the total contribution paid by taxpayers, thus shifting value from both groups of participants to taxpayers. The financial position of the fund is unchanged throughout; the change in the final asset value, therefore, is zero.

Changes in indexation policy shift value across groups of participants. By halving indexation, RP 2.1 lowers the contract value for plan participants and thus shifts value from participants to taxpayers, who pay smaller amortization and employer support contributions; the long-term expected improvement in the funding ratio and lower accrued pension rights relative to its baseline also raise residue value of the fund. Under RP 2.2, conditional indexation has qualitatively similar but quantitatively larger value-shifting effects across stakeholder groups, because there is no indexation at times

when it is most valuable and more indexation when it is less valuable.

All pension plans discussed so far have kept the asset mix constant at 50% fixed income and 50% equity. Changing the asset mix changes the risk in the pension fund. Under a symmetrical contract, this should not lead to value transfers, as higher volatility is rewarded with higher expected returns; however, the pension plan policy in question is not symmetrical from the taxpayers' perspective. When bad returns materialize, taxpayers must cover the deficit by increased amortization and employer support payments, but good returns do not necessarily lead to lower contribution payments, as the contribution can never fall below the normal cost level. That is, contribution payments are limited on the downside but unlimited on the upside.

When riskier investments are made under RP 3.1, the upside potential of the returns goes to the residue of the pension fund, but the downside risk goes to the taxpayers in the form of higher amortization and employer support payments. Therefore, we see negative value changes for taxpayers and an increase in residue value. When the portfolio is de-risked under RP 3.2, the opposite occurs: a much lower downside risk of portfolio returns results in a lower probability of high amortization support payments, making the current generation of taxpayers better off, but a less risky asset mix also means lower expected returns, which produces a negative effect on the residue value. Future cohorts of taxpayers are also hurt by lower expected returns, as they must cover the deficit through employer support when assets are depleted. Since neither the indexation policy nor the participant contribution rules are changed, fund participants are not affected by changes in portfolio composition.⁶

Table 6: Value Effects Expressed as a Percentage of 2010 American GDP

RP	Description	Value Effects on		
		Taxpayers	Plan Participants	Benefits after 75 Years
1.1	0% amortization	+2%	–	–2%
1.2	100% amortization	–19%	–	+19%
1.3	Amortization 10 years	–33%	–	+33%
1.4	Participants contribution doubled	+30%	–30%	–
2.1	Indexation half of CPI	+20%	–38%	+21%
2.2	Conditional indexation	+28%	–55%	+27%

The ALM calculations take 2010 as the starting year. [Table 6](#) reports on the size of the transfers as a percentage of 2010 American GDP (US\$14.6 trillion). The additional contributions in RPs 1.2 and 1.3 would decrease value for current and future taxpayers by 19% and 33% of 2010 GDP respectively. RP 2.2, which produces lower benefits, amounts to a value loss of 55% of GDP for the plan beneficiaries, while taxpayers experience a value gain of 28% of GDP; the remaining 27% contributes to additional underpinning of the benefit obligations coming due after the end of the 75-years projection horizon.

Key Insights from Value-Based ALM Analysis

Our value-based ALM analyses indicate that two measures in particular would be effective in changing the trend of underfunding in American state and local pension plans, and thus producing longer-term sustainability: first, a quicker and less limited recognition of the amortization burden in the contribution rate; and, second, a mitigation of inflation indexation, either by rule or by relating indexation to the funding ratio. However, both measures lead to high transfers of value. The more effective amortization strategy transfers value from current taxpayers to future taxpayers on the order of 20% to 33% of 2010 American GDP, depending on the specific measure under consideration. The less generous indexation variants produce net value transfers from current and future beneficiaries to taxpayers on the order of 28% of 2010 American GDP, and to better funding of future rights on the order of 27% of 2010 American GDP.

Endnotes

- 1 We gratefully thank the Rotman International Centre for Pension Management (ICPM) for a research grant. We also thank two anonymous referees for their comments on the previous version of this article. The article is based on the full report of the supported research (Lekniute et al. 2014).
- 2 Under the EAN method, the employer's annual normal cost associated with an individual participant is calculated as a payment throughout the projected years of service needed to finance the present value of benefits (PVB) obligation. Because the accrued benefits due to salary growth increase more than linearly, the method implies a component of front loading, since the employer is pre-paying some of the benefits to be earned in the future.
- 3 Under all plans, as in the baseline, we assume that indexation is always full (i.e., negative) in the case of negative CPI inflation. This assumption is made for ease of interpretation, as it is more intuitive to always have a 100% pension result with the policy of full indexation to CPI. The effective implementation of this policy may be blocked in reality, however, especially in case of a severe benefit cut or a prolonged period of deflation (as in Japan).
- 4 Future returns may well be lower than the historical returns over the past several decades. If this is the case, then the problem of underfunding will be even bigger than reported here.
- 5 In a perfect labor market with rational behavior, employer and employees negotiate gross labor compensation equal to the present value of marginal labor productivity, part of which may come in the form of pension promises. When the net value of the pension promise declines, either through higher employee contributions or through lower indexation value, rational representatives of American state and local employees should negotiate an offset for this loss, claiming higher wages, so that the sum of gross wages and net value of the pension promise remains unchanged. Such a response requires a sufficiently strong negotiating position for unions. When state and local pension plans are in trouble, however, going for full compensation may exacerbate the funding problem, eventually leading to default on the part of the state or city (the example of Detroit is illustrative).
- 6 Lekniute et al. (2014) offers a deeper analysis of value effects, reporting the relative value effects of changes to the plan for each stakeholder and depicting the value consequences of contract changes for individual cohorts of plan participants and taxpayers.

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