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Adding Actuarial Estimates of Defined-Benefit Pension Plans to National Accounts

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The paucity of data on the growing risks to financial stability during the run-up to the financial crisis of 2007–2008 has highlighted the need for better data on the entities classified in the financial corporations sector in the System of National Accounts (SNA). For countries with high levels of participation in employer-sponsored defined-benefit (DB) plans, national accounts will take an important step toward this objective with the introduction of the new actuarial measures of DB pension plans that are recommended in the 2008 SNA (United Nations Statistical Division 2009). The 2008 SNA (17.191–17.206) also calls for a supplementary table showing actuarial measures of government-sponsored plans that will allow comparisons between countries where employer-sponsored DB pension plans have a major role in providing retirement income and countries where government-sponsored plans predominate. For both kinds of countries the new measures will provide a more complete picture of saving and wealth of households, and of pension expenses and pension liabilities of employers.

In many countries, including the United States and France, social security provides a base level of retirement income, with an overlay of a supplementary system of government-sponsored or employer-sponsored pen-

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sion plans. Social security plans generally differ from other government-sponsored plans in the main features of their benefit formulas (the social security formula may have a benefit ceiling and may consider earnings over virtually the entire working-age portion of the life cycle, for example), but the two types of plans have some critical similarities that allow us to treat government-sponsored pension plans as a form of social security. Three noteworthy features of social security and government-sponsored pension plans separate them from employer-sponsored DB pension plans:

1. Payment of benefits that have been accrued under existing plan rules is not a contractual obligation, so retroactive reductions in the generosity of the benefit formula are possible.[1]
2. Mandatory participation for broad segments of the population and the negligible chances of a plan freeze or plan termination allow the plan to rely on contributions from future participants to help fund accrued benefits.
3. Contribution rates are usually fixed by law rather than adjusted as needed to maintain plan funding levels.

Because of the second and third features, analyses of the sustainability of government-sponsored plans must be based on open group projections, where an open group includes future participants in the plan. In particular, the ability to rely on contributions from future participants to pay accrued benefits allows government-sponsored plans covering a growing population of participants to operate on a pay-as-you-go (PAYGO) funding basis, so many of these plans are, or at least once were, PAYGO plans.

The measures of households' actuarial pension wealth used in national accounts will, however, be based on projections for the *closed group* comprising only the current participants in the plan (which include persons currently in covered employment or who are entitled to receive benefits). These measures will allow international comparisons of income, wealth, and saving, and for countries with well-developed systems of employer-sponsored DB pension plans, they will also be useful as sustainability indicators. Open group projections are rarely used to measure the sustainability of employer-sponsored DB pension plans because expected contributions from future cohorts of participants are too uncertain to count as an implicit asset. Also, the case of projected benefits that exceeded projected contributions linked to future participants would be handled by raising the assumed future con-

1. Based on this criterion, pension plans for general government employees will be treated as government-sponsored plans when member countries of the European Union start to include supplementary actuarial measures of social security and other government-sponsored plans in their national accounts (Eurostat-ECB 2011, 27).

2. An exception might be made for a pension plan that uses flawed actuarial methods or assumptions that can be projected to result in inadequate contributions for future participants. For example, state and local government plans often use a high interest rate to discount benefit payments, which leads to underestimation of service costs.

tribution rate.[2] Because transactions with future cohorts of participants are out of scope, to be considered fully funded an employer-sponsored DB plan needs to have assets equal to the actuarial value of the benefit claims of the current plan participants.

A challenge in developing a single set of international standards for actuarial measurement in national accounts was the diversity of pension institutions that exist in different parts of the world. To explore the implications of institutional diversity, in this chapter we develop actuarial measures of pension and social security plans for national accounts for countries that represent the two poles of this institutional diversity, the United States and France. In the United States, benefit entitlements from employer-sponsored pension plans are a major source of retirement wealth for households and only one industry has a government-sponsored pension plan, but in France DB pension benefits come almost entirely from government-sponsored plans. We therefore develop comparable measures of actuarial values of benefits from social security and government-sponsored pension plans for the United States and for France, and for the United States we also estimate actuarial values of household's income and wealth from employer-sponsored DB plans. Using these measures, we consider the kinds of international comparisons that are made possible by the new actuarial measures called for in the 2008 SNA.

A warning to bear in mind in using actuarial estimates of DB pension and social security plans, including ours, is that actuarial measures depend on assumptions about interest rates, mortality rates, separation rates, and future rates of increase in wages and prices. Also, the pension actuary must choose between an approach that seeks to smooth over the career the accretion of the projected pension wealth at retirement, or an approach that measures the present value of accrued-to-date benefits, which are sometimes defined as the benefits that would be due to plan participants if the plan were to be frozen or replaced with a different plan. In contrast, cash-accounting measures, such as the value of the assets in the trust fund or the employer's contribution to the plan, require no assumptions. The objective nature of cash measures is an attractive feature for national accounts purposes. Nevertheless, the ambiguities and uncertainties entailed in actuarial measurement are unavoidable if we want a full picture of the operations of social security plans and pension plans.

6.1 The Retirement Income Systems of the United States and France

6.1.1 The United States

Defined-benefit pension and social security are important elements of the retirement income system of the United States, but they are not the only important elements. The US retirement income system has four components:

- tax-advantaged accounts not sponsored by an employer, such as Individual Retirement Accounts (IRAs) and annuities purchased from life insurers;
- employer-sponsored defined-contribution (DC) pension plans, which provide resources in retirement based on the value of the assets in plan;
- employer-sponsored DB pension plans; and
- government social insurance plans, which include a social security plan for the general population, a government-sponsored pension plan for the employees of the railroad industry, and the Pension Benefit Guarantee Corporation (PBGC), which insures the receipt of benefits that have been accrued in private DB pension plans up to a ceiling.

The pension plan components of the system are needed because earnings replacement rates from social security are low for middle and higher earners. Social security has a highly progressive benefit formula and an earnings ceiling ($8,900 per month in 2010) above which earnings are not replaced at all, and it also reduces benefits for retiring before the full retirement age (presently sixty-six but scheduled to rise to sixty-seven). For example, the projected replacement rates in the 2009 Social Security Trustees' Report for prototypical low, middle, and high earners retiring at age sixty-five in 2010 are 54, 40, and 33 percent of averaged indexed monthly earnings, respectively. Nevertheless, pension plan coverage is far from universal. About half the jobs in the private sector and virtually all government jobs come with a pension plan. In the 2007 Survey of Consumer Finances, 57.7 percent of households had either a DB or a DC pension plan from a current or former employer (Bucks et al. 2009, A24).

Looking at assets held by retirement plans in the United States (table 6.1) in the government sector, DB pension plans predominate, with 4.321 trillion dollars in assets in 2007, compared with just 1.137 trillion dollars in DC plans. For the economy as a whole, DB plans are also more important, with about $7 trillion in assets, compared to about $5 trillion for DC plans. Over the past two decades, however, in the private sector newly established pension plans have been predominantly structured as DC plans, and many DB plans have also been frozen or terminated and replaced with DC plans. As a result, in the private sector, DC plans are now more important than private DB plans. Combining Simplified Employee Pension (SEP) plans and Savings Incentive Match Plan for Employees (SIMPLE) IRAs (which should be classified as DC pension plans because they are employer sponsored) with ordinary DC plans gives a total of 3.866 trillion dollars in assets for private DC plans in 2007, compared with 2.646 trillion dollars in private DB plans.[3]

3. Railroad retirement includes a component (tier 2) that functions like a DB plan even though it is a government social insurance program. If we add this part of railroad retirement to private DB pension plans, the total assets in private DB plans or plans that substitute for them is $2.747 trillion.

Table 6.1 **Retirement assets of households in the United States by type of plan, 2007 (billions of dollars)**

Type of plan	Assets
Defined-benefit pension or functional equivalent	**7,067.8**
Defined-benefit pension	**6,966.9**
Private[a]	2,646.3
Government sector	4,320.6
State and local government	3,368.9
Federal government employees	945.1
Federal Reserve system	6.6
Government social insurance that replaces DB plans	**100.9**
Pension Benefit Guarantee Corporation (single employer)	68.4
Railroad retirement, tier 2	32.5
Defined contribution	**5,003.0**
Private	3,866.0
Private plans[a]	3,537.0
SEP and SIMPLE IRAs	329.0
Government sector	1,137.0
State and local government[b] (403[b] and 457 plans)	904.0
Federal government (Thrift Savings Plan and FDIC plan)	233.0
Self-funded and rollover funded	**6,047.0**
Traditional and Roth IRAs	4,455.0
Annuities from life insurance companies	1,592.0
Total pension and self-funded	**18,177.8**
Social Security Old Age and Survivors Trust Fund and railroad retirement social security equivalent benefit account	**2,024.3**
TOTAL	**20,202.1**
Memo: Disposable personal income	**10,423.6**

Sources: Private DB and DC plans: EBSA Private Pension Plan Bulletin 2007, table A1; state and local government DB plans: 2007 Census of Governments; federal government: Sept. 2007 Treasury monthly statement; PBGC: PBGC 2008 Annual Report; Federal Reserve System: Federal Reserve System Thrift & Retirement Plans, 2007 Annual Report; Social Security: Social Security 2009 statistical supplement, table 4A1; IRAs, state and local government DC plans and annuities: Investment Company Institute *Research Fundamentals* (Brady, Holden, and Short 2010); Federal TSP: ICI *Research Fundamentals*, July 2008, fn 21.

[a]Filers of IRS Form 5500. Excludes plans with only one participant, and funds held by life insurance companies under allocated group insurance contracts for payment of retirement benefits, which amount to 10 to 15 percent of total private pension fund assets.

[b]Includes plans sponsored by nonprofit educational institutions serving households.

Furthermore, IRAs and annuities not held in IRAs rank ahead of DC plans in importance as measured by assets. However, much of the money in these vehicles comes from rollovers of amounts that were originally saved in DB or DC pension plans. For example, from 1990 to 2009 there were about 66,000 standard terminations of private DB plans.[4] In these terminations, the plan sponsor purchased group annuities to provide the benefits that were

4. See PBGC Pension Insurance Data Book 2009, table S-3.

accrued prior to the termination date or gave the plan participant a lump sum that could be rolled over into an IRA.

In 2007 Social Security had 162.3 million participants with covered earnings, compared with almost 42 million participants in private DB plans and about 70 million active participants in DC plans (US Dept. of Labor 2010, table A1).[5] Despite its much larger number of participants than private pension plans, the trust fund for the old age and survivors insurance (OASI) component had only about $2 trillion in assets in 2007, compared with about $2.6 trillion for private DB plans, and $3.6 trillion for private DC pension plans. The relative paucity of assets in the Social Security Trust Fund can be attributed to its late start on asset accumulation, which only began after the reforms of 1983, and to gaps between the present values of lifetime benefits and lifetime contributions for past participants. Had Social Security operated on a fully funded basis from its inception in 1935, the balance of the OASI fund alone would probably have been about $15 trillion (Board of Trustees 2008, 62). This figure is much larger than the $5.7 trillion trust fund balance in 2007 that was projected to be sufficient to maintain solvency of the OASI trust fund for the next seventy-five years, in part because of excesses of contributions over benefits (measured in present-value terms) for future participants. Benefits paid by Social Security (including the disability insurance component) are $575.6 billion in the national accounts for 2007, not much smaller than the $773.7 billion paid by private DB and DC pension plans put together. Allowing for the fact that the figure for private pension plan benefits includes some rollovers into annuities, early withdrawals by persons who are not retired, and benefits received by retirees below sixty-two (the youngest age of eligibility for Social Security), aged retirees probably receive more benefits from Social Security than from DB and DC pension plans.

6.1.2 France

The retirement income system of France consists of a general social security plan known as "Caisse nationale d'assurance vieillesse des travailleurs salariés" (CNAVTS), or now just as CNAV, and a network of thirty-five compulsory industry-specific "complementary" pension plans. Like tier 2 of railroad retirement in the United States, these complementary plans are government-sponsored plans. Despite some diversity in retiree and survivor benefit formulas, they are almost all converging to the same set of legal requirements for their main parameters, such as the required length of a full career and the minimum retirement age.[6] They are recorded in the social security sector in the national accounts of France with the exception of

5. Note that some employees have both a DB plan and a DC plan, so adding together the number of participants in each type of plan overstates the total number of employees who have a private pension plan.

6. The military and some other types of workers are still allowed to retire at earlier ages.

the state civil servant plan. That plan is included in the central government sector, but in the future this may change, as the 2010 pension law requires a report on the creation of an explicit plan for state civil servants.

The complexity of the French pension system derives from its history. The CNAVTS plan was created just after the end of World War II as a PAYGO social security plan, and a 1946 law was supposed to extend its coverage to the whole population. This plan provided wage earners a basic pension equal to 50 percent of the reference salary up to a ceiling, adjusted by the ratio of the actual length of the career to the required length of a full career.[7] The ceiling in CNAVTS was low, however, so there was a need for complementary pension plans. Managers started the first of these (AGIRC) in 1947 with an interprofessional agreement, and a plan for nonsupervisors (ARRCO) followed in 1961. Participants in these pension plans accrue points as they and their employer make contributions during their working years, and benefits during retirement equal the number of points accrued during the career times an annually published value of a point. Independent social security plans were also created in 1948 and 1952 for own-account workers with their own complementary pension plans.

Finally, even though CNAVTS was supposed to cover the whole employed population, some previously existing pension plans (e.g., state civil servants, miners, sailors, railway, public utilities, central bank, national opera and theater) never joined the system. These plans, which are known as the "special regimes," offered benefits that were generally high enough so that an additional benefit from CNAVTS was unnecessary. For example, the state civil servant plan, which many of the special plans resemble, provides a pension equal to 75 percent of the final salary excluding bonuses times a ratio equal to the actual length of the career divided by the required length of a full career. The relative size in terms of numbers of contributors and amounts of benefits paid of the various types of retirement plans in France is shown in table 6.2. The benefits row of the table also includes assistance provided by the general government and privately purchased supplementary annuities from life insurance companies.

All of the basic and complementary pension plans are classifiable as government social insurance. A 1972 law mandated participation of all wage earners in a complementary pension plan and established the principle of interprofessional solidarity. As a result, the plans are interconnected by financial interchanges in which "younger" plans with relatively high numbers of contributors help the older ones. Furthermore, integration of the special regimes into the CNAV is always a possibility if their finances become too out of balance; for example, the public utilities plan, the clergymen plan,

7. Before 1971, the reference salary was defined as the final salary and the required number of years was thirty. After this date, the reference salary was the average of the ten best years and the required number of years was 37.5.

Table 6.2 **Relative size of the French retirement regimes as measured by contributors and benefits paid, 2009 (percentages of national total)**

	Private wage earners		State civil servant	Other "special regimes"	Self-employed	Assistance	Supplementary annuities from life Insurers
	Basic	Complementary					
Contributors	71.7	71.7	9.3	9.3	9.7	n/a	n/a
Benefits	33.9	24.1	14.9	12.4	9.7	4.6	2.3

and some smaller plans were absorbed into the CNAV in 2005 or 2006. Furthermore, despite the diversity of the plans, the solidarity principles of social security are respected, thanks to rules that specify a uniform set of policies regarding minimum benefits, the supplements for children, and the noncontributive periods included in pension calculation. Contributions to the plans during periods of unemployment, maternity leave, illness, and disability are financed by general tax revenue channeled through the "Fonds de solidarité vieillesse" (FSV). Changes in laws applying to social security are also applied to all the compulsory plans. (Though, with such a large number of them, achieving universal compliance is not necessarily easy!)

The compulsory pension plans have little or no income from assets and receive only a limited amount of external funding from general tax revenue via the FSV, so their finances can be approximated by the equation that links the outlays of a PAYGO plan to its income:

$$\text{average contribution} \times \text{no. of contributors} = \text{average benefit} \times \text{no. of beneficiaries.}$$

The three "internal" parameters of the above equation are: the contributor-beneficiary ratio, the contribution rate, and the replacement rate (i.e., average pension/average salary). Unfortunately, declines in birth rates (and, to a lesser extent, rising longevity) have resulted in a downward trend in the contributor-beneficiary ratio. It was 4 in 1960, 1.8 in 2008, and it would have fallen to around 1.2 in 2040 if not for the increase in the retirement age in the 2010 reform of the retirement system.

To cope with the imbalances created by the downward trend in the contributor-beneficiary ratio, a series of pension reforms have been undertaken. Because the plans are not organized as American-style, employer-sponsored pension plans, cuts to existing benefit entitlements are possible, and indeed, only those who were already retired at the time of the reform have been spared from sacrifice. A 1993 reform of private sector pensions changed indexation from wage growth to prices and increased the minimum length of career for a full pension from 37.5 to 40 years for people reaching 60 in 2008, or to 41 years for people reaching 60 in 2012. The 1993 reform also increased the number of years for calculation of the reference salary for social security from ten to twenty-five. In 2003, the extension of the

required length of career was also applied to the special regimes, and additional benefit reductions were imposed on early retirees in all types of plans. The 2003 reform also provided for regular reviews of the plans' finances (the next of which will occur in 2018), with measures taken as necessary to correct imbalances. There was also a reform of AGIRC and ARRCO in 1994 that increased the cost of a point and changed the indexation of the value of a point. Another step to cope with future declines in contributors was the creation in 1999 of a buffer fund (the "Fond de réserve des retraites" [FRR]) to close the financing gap of the CNAV after 2020. At the end of 2009, its assets amounted to 1.75 percent of the gross domestic product (GDP).

Unfortunately, the financial crisis of 2007–2008 deepened the structural imbalances of the French retirement system. The combined deficits of the CNAVTS and FSV grew to 13.8 billion euros in 2010. With the system's annual deficits projected to reach about 2 percent of GDP by 2020, the government decided to undertake another reform. The minimum retirement age was raised for most people, including the government's own employees, from sixty to sixty-two starting in 2018, and the full retirement age was also raised from sixty-five to sixty-seven.[8] Also, the required length of career was extended to 41.25 years in 2013. However, this last reform is projected to have a limited impact on the financing gap. This is confirmed by the authors' estimates with PROST, a social security modeling program of the World Bank (see appendix B).

The past rounds of pension reforms have highlighted for French households the lack of certainty of the benefits that they are currently scheduled to receive when they retire. In response, many households have begun to invest in privately funded retirement accounts. A popular vehicle for this is investments with the life insurance industry, whose technical reserves have grown at the average pace of 12 percent a year since 1993, double the growth rate of total financial assets in general. (Life insurance represents 36 percent of households' financial assets in 2009 but only 12 percent of total assets, as real estate plays a major role in households' wealth in France.) Yet pension plans sponsored by employers still have a very limited place in France. Apart from book reserve plans, which are difficult to estimate, they consist of DB plans managed exclusively by insurance corporations and, since 2003, defined-contribution plans known as PERCO (*plan d'épargne pour la retraite collectif*) plans, which resemble the 401(k) plans of the United States. Providing for only 2.3 percent of retiree benefits in 2008, the employer-sponsored plans comprise between 64 billion euros of entitlements in defined-contribution plans (of which 2 billion euros are in PERCO) and 43 billion euros of benefit entitlements in defined-benefit plans (table 6.3).[9] All together, they amount to 12 percent of technical provisions in life insurance, but just 1.3 percent of

8. The minimum age for claiming benefits had been reduced from sixty-five to sixty in 1982.
9. Personal retirement accounts have an additional 28 € billion.

Table 6.3 **Private pension plans in France by type of plan (amounts in € billion)**

Nature		Sources	Type	Status in fin. accounts	Reserves	Contributions	Pensions
	Collective insurance contracts with employer contribution						
Social insurance in life insurance	Defined contribution (art 82 CGI)	DREES	dc	Life insurance reserves	2.9	0.3	0.2
	Defined contribution (art 83 CGI)	DREES	dc		42.0	2.9	1.2
	Individual workers (Madelin)	DREES	dc		16.2	2.2	0.4
	Farm workers	DREES	dc		2.7	0.2	
	Defined benefit (art 39 CGI)	DREES	db	Life insurance reserves	31.5	3.6	2.8
	Retirement lump sum	FFSA	db		9.7	0.9	1.1
	Collective employment related schemes						
Social insurance in pension funds	PERCO	AFG	dc	Mutual funds shares	1.9	0.9	
	Individual pension plans						
Life insurance	PERP	DREES	dc	Life insurance reserves	4.1	1.0	
	Other individual plans	DREES	dc		24.5	1.0	0.5
	Book reserves						
Employer sector	companies net liabilities	Mercer	?	Not yet recorded	27.0	?	?

total household sector assets. The total pension wealth held in these plans is about 5.5 percent of GDP, compared with DB and DC plan pension wealth of about 90 percent of GDP in the United States.

6.2 Measurement of Social Security Plans in National Accounts

Like tier 2 of railroad retirement in the United States, the thirty-five government-sponsored pension plans of France meet the SNA criteria to be classified as social security (United Nations Statistical Division 2008, 4.124). Even though all the plans, including the CNAVTS, are managed by representatives of the employers and the employees, they are subject to detailed regulation and to oversight by state auditors, they receive government subsidies, and the state has the ability to reduce the value of benefits that have already been earned and bears ultimate responsibility for shortfalls in plan funding. They are all recorded in the social security sector in the national accounts of France, except for the state civil servant plan. At present this plan is included in the central government sector because of its lack of existence as a distinct institutional unit, but in the future this may change as the 2010 pension reform law requires a report on the creation of an explicit plan for state civil servants in the interest of financial transparency.

Accounting for social security plans (and other government social insurance programs) in the core national accounts is very straightforward. Neither the social security trust fund nor the actuarial value of scheduled future benefits is treated as part of households' net worth. Household income from social security is therefore recorded when benefits are paid, and contributions to social security are excluded from household income.

A new supplementary table that shows benefit entitlements for all pension and social security plans is recommended in the 2008 SNA (17.191–17.206). The measures of social security plans in this table will be similar to the measures that are used for employer-sponsored DB pension plans, but with some differences in nomenclature. In particular, the gap between the actuarial value of benefits accrued during the year and actual contributions during the year will be labeled "employer-imputed social contributions" in the case of DB employer-sponsored pension plans, whereas for social security plans this gap will be labeled "other (actuarial) accumulation of pension entitlements."

6.3 Measurement of Employer-Sponsored Pension Plans in National Accounts

The French national accounts do not, as yet, include a pension plan sector. The PERCO plans are included in the mutual fund sector and pension plans managed by insurance corporations are in the insurance sector. According to SNA 2008 (4.116) "The pension fund subsector consists of only those social insurance pension funds that are institutional units separate from the

units that create them." The status of these plans as social insurance is clear, but it is less obvious that they qualify as independent institutional units. The PERCO are collective agreements and not institutional units. Funds are managed by investment fund managers and kept with a custodian, but they are owned by the beneficiaries. As defined-contribution schemes, returns net of the management fees go entirely to beneficiaries. In addition, the plans that are managed by insurance companies are not isolated from other life insurance contracts unless the insurance company decides to ring-fence such collective contracts and the corresponding assets under the 2008 law on supplementary pension institutions. At the end of 2009, none of the life insurance plans had such a ring fencing. Nevertheless, even if it is decided that a separate pension fund sector is unnecessary for these employment-related pension plans, a change in the treatment of employer contributions to be part of the compensation of employees will still be appropriate.

In contrast to France, the United States has a well-developed system of employer-sponsored pension plans. These plans are currently accounted for in the US National Accounts in accordance with the recommendations of the 1993 SNA (United Nations Statistical Division 1993). In the comprehensive revision of the US National Accounts that is scheduled for 2013 the treatment of DB pension plans will change, however. The new treatment will be consistent with the measurement goals of the new recommended method for measuring DB pension plans in the 2008 SNA. However, it will depart from the detailed guidelines of the 2008 SNA in some notable ways.

6.3.1 The Approach of the 1993 SNA

In the 1993 SNA, funded DB pension plans are accounted for in the same way as DC pension plans in measuring household saving. In a DC pension plan, the participants' pension wealth consists of the assets held in the plan, so employer contributions to DC plans represent compensation income to the plan participants. Benefit payments from those plans do not represent income flows, because they merely move participants' wealth from one location to another.

Similarly, treating the assets of funded DB pension plans as the property of the plan participants means that compensation income for households should be recorded when employers make contributions to these plans, and that the investment income from the plan assets should be included in the property income of households. In addition, under this approach payments of benefits to retirees, along with contributions made by employees to DB plans, are purely financial transactions. Finally, the plans' administrative expenses are included in household consumption expenditures.

In the US National Accounts, the same approach is used both to measure household saving and to measure household income. In this chapter, we will also measure employer-sponsored pensions in just one way, using the kind of approach that the SNA recommends for measuring household

saving for purposes of measuring both household income and household saving. However, to avoid confusion, we acknowledge that the SNA (in both its 1993 and 2008 versions) treats pension plans differently when measuring household income from the approach that we take in this chapter. In particular, the SNA places employer-sponsored pension plans outside the boundary of the household sector when measuring household income, and inside that boundary when measuring household saving. With the plans outside the boundary of the household sector, payments of benefits represent flows of income to households, so in measuring household saving, the original measure of household income in the SNA is adjusted by adding saving by pension plans, or, in the language of the SNA, "adjustment for the change in pension entitlements." This has the effect of removing benefit payments from household income and replacing them with pension contributions plus investment income earned by the pension plan's assets because saving by a funded DB plan equals the plans' income from employer contributions, employee contributions and investment returns less the plans' expenses for benefit payments and administration.[10]

6.3.2 The Approach of the 2008 SNA for Purposes of Measuring Household Saving

A key innovation in the 2008 SNA is actuarial measurement of employer-sponsored DB pension plans, including ones that are unfunded. This will allow the national accounts to move from a cash approach to an accrual approach to measuring DB pension plans. The most straightforward way to implement the actuarial approach for a DB plan is to treat the actuarial value of the benefit entitlement as the sole pension asset of the plan participants, and this is the approach that the 2008 SNA (17.151–17.176) recommends. Also, the new measure of compensation income is to be the present value of the claims to benefits earned by active participants through service to the employer. The new accrual approach therefore avoids the arbitrariness in the timing of the recording of compensation income that occurs under the cash accounting approach when employers defer their actual contributions and then later make extra contributions to catch up with funding targets.[11]

10. The NIPA tables published by the BEA do not report saving by defined-benefit pension plans, but estimates of saving by DB pension plans are occasionally published as part of a set of alternative measures of personal saving. See Perozek and Reinsdorf (2002), Reinsdorf (2004), and Reinsdorf (2005).

11. Under an idealized set of assumptions, cash accounting would provide a complete picture of the operations of a defined-benefit plan. In particular, the assets in a defined-benefit plan will measure the wealth of the plan's participants in the form of accrued benefit entitlements and the employer's contribution to the plan will measure the income of the participants in the form of benefit accruals if there are no deviations of: (a) realized investment returns from the assumed interest rate; (b) employer contributions from benefit accruals net of any required employee contributions; (c) outcomes for salary increases, separations, and mortality from previous assumptions; and (d) plan features from those in effect at the time of plan inception. These assumptions may not be even approximately true in practice.

In the new table on the transactions of DB pension plans that is recommended in the 2008 SNA, the cash measure of employee compensation from participation in DB pension plans will still be shown, but it will be labeled as "employer actual contributions." The difference between the actuarial value of benefits earned through service to the employer plus the administrative expenses of the plan minus employee contributions to the plan will be also shown with the label "employer-imputed contributions." Total employer contributions then equal the amount that employers need to contribute to cover the cost of claims to benefits arising from covered employment and the administrative cost of running the plans. Employer contributions represent the compensation income that employees receive in the form of rights to pension benefits and the administrative services of the pension plan manager.

In addition, rather than measuring property income of the households participating in DB plans by the income generated by plan assets, the 2008 SNA measures household property income by the interest accruing on households' benefit entitlements. This has the important advantage that the sum over the lifetime of a participant in a DB plan of the actuarial value of the benefit entitlements earned through service to the employer and the interest on accumulated benefit entitlements equals the sum of the benefits paid if the assumptions used in the actuarial calculations are all realized. The accrual measure of household income of the 2008 SNA from actual and imputed employer contributions and from interest on the benefit entitlement thus corresponds to the future cash flows of benefits to households. It is also consistent with the growth in household wealth from participation in DB plans.

Nevertheless, despite these important advantages, the measure of household income from DB pension plans in the 2008 SNA has an implication that users of the national accounts may find paradoxical: the saving of the DB plans themselves will generally be nonzero. Nonzero saving by DB plans means that income resources and income uses of DB pension plans are not in balance. For example, negative saving by DB plans, which is much more likely than positive saving, implies that households are accruing claims on the plans that exceed the amounts that the plans will be able to pay if they have no other resources besides those counted in plan income.

In the recording scheme of the SNA, the income received by DB plans consists of property income on plan assets, actual contributions of employers and employees, and imputed employer contributions. The imputed contributions are defined as having the value that is necessary to bring total contributions (actual plus imputed) into balance with the value of the benefit entitlements being accrued via service to employers (plus the value of the pension plan administrative services). Imputing analogous payments of interest income from employers to plans (or from plans to employers if the plans have more property income than is needed to satisfy the claims of households) would bring the plans' receipts and payments of property income into balance as well. Yet the SNA has no imputed receipts of prop-

erty income by plans, so in the recording scheme of the SNA, saving by DB plans equals the difference between the property income that the plans receive on their assets and the imputed interest that households receive on their benefit entitlements. This difference is likely to be negative for plans that are underfunded, or for plans that invest in assets that are expected to generate holding gains even if they are fully funded.

Investors in equities treat holding gains as a substitute for dividends, and over the long run investment returns on equities often come more from holding gains than from dividends. Holding gains on plan assets are commonly relied upon by DB pension plans as a source of funding for their benefit obligations. Yet they are excluded from the definition of income in national accounts because holding gains and losses arise from changes in the price of assets that already exist, not economic production. In the full sequence of accounts that is recommended by the SNA, holding gains and other changes in assets are shown in accounts that appear below those showing income and saving.[12]

If the SNA measure of saving by DB plans is negative because the plans have invested in assets that are expected to provide investment returns in the form of holding gains, an argument can be made that the negative saving by DB plans has a reasonable economic interpretation. The argument is that to use holding gains to fund benefit payments, cash must be raised by selling the appreciated assets. But using sales of assets to cover expenses that exceed current income means that saving is negative. Thus, depicting fully funded DB pension plans that hold assets that are supposed to generate holding gains as having negative saving is justifiable even though the plans' finances are expected to be sustainable.

In contrast, no rationale exists for allowing DB pension plans to have negative saving if the shortfalls in their property income are attributable to shortfalls in plan assets and in past contributions. Delays in making the contributions needed to cover the cost of newly accrued benefit entitlements result in a funding gap for the DB pension plan because they deprive the plan of the opportunity to earn property income. For the plan to have the means to pay the benefits when they fall due, the property income that the plan would have earned had the contributions been made on time will eventually have to be replaced by someone.

If the lack of property income is caused by plan underfunding, a flow

12. In France, the INSEE publishes the current account showing saving and investment and the Banque de France publishes the financial accounts. In the latter, the change in the balance sheet from one period to the next is decomposed through three sets of accounts: the transaction accounts (where new issues, redemptions, acquisitions and sales are traced and balanced with net lending/borrowing); the valuation accounts for holding gains and losses; and the other changes in assets accounts for reclassifications. In the US statistical system, the BEA publishes estimates of saving and capital transfers in the NIPAs and the Federal Reserve Board publishes estimates for the personal sector of net acquisitions of assets, holding gains and losses, and change in wealth in the Flow of Funds Accounts (FFAs). The BEA brings together information from the NIPAs and the FFAs in its integrated macroeconomic accounts.

of imputed interest income to the DB plan from the party responsible for replacing the plans' missing property income should be recorded. This will prevent the accounts from showing negative saving by DB pension plans. In the institutional setting of the United States, the responsible party is the employer; indeed, in its treatment of employer-imputed contributions, the SNA seems to assume that the responsible party is always the employer. Nevertheless, it is possible that in some institutions' settings the plan participants or the government may have to bear at least some of the burden of adjustment. If no one can predict whether the cost of filling pension plan funding gaps will ultimately be borne by employers, employees and retirees, or the government, the best recourse may be to allow underfunded pension plans to be shown as having negative saving.

6.3.3 Measuring the DB Plans of the United States in a Way That Makes Their Saving Zero

In the institutional setting of the United States, employers are generally legally or contractually responsible for ensuring the payment of the benefits due to the participants in the DB plans that they sponsor. The measurement framework that is recommended in the 2008 SNA is not well suited for handling underfunded pension plans in this kind of institutional setting.[13] In particular, to reflect the growth in employers' obligations to make additional pension fund contributions when plans lack property income as a result of lack of assets, interest charges on the claim of the DB plan on the employer for the contributions needed to cover the unfunded actuarial liability (UAL) must be imputed. In effect, failure to make actuarially required contributions when they are due is treated as borrowing from the pension plan, with an associated interest expense for the borrower.

Counting imputed interest on the UAL as an income source for DB plans may, however, not be enough to prevent a negative estimate of saving by these plans if the interest accruing on the total benefit entitlement is used to measure the property income that households receive from the plans. Suppose that we measure households' property income in this way for a plan that has a positive UAL. Then the imputed interest received by the plan from the employer in connection with the UAL cancels the imputed interest paid by the plan on the unfunded portion of benefit entitlement, so saving by the

13. The 2008 SNA (paragraph 17.165) does provide for a special treatment of DB plans when employers are contractually liable to a third party for the funding gaps of their plans, recommending that in this case a claim of the plans on the employers should be recorded such that the plans have a net worth of zero at all times. The implications of doing this closely resemble the approach that we recommend here, so the main difference between our approach and the 2008 SNA is that we treat employers as liable for plan-funding shortfalls under a broader range of circumstances. Indeed, it could be argued that these circumstances are overly broad because state and local government employers do sometimes respond to pension-funding gaps by shifting some of the burden of closing those gaps to their employees via increases in contribution rates. Adjusting our estimates to allow for this would, however, be practical.

plan equals the plan's property income from interest, dividends, and rental income earned by its assets less its interest expense calculated by multiplying the rate of interest assumed in the actuarial calculations by the value of the plan assets. Multiplying the interest rate assumed in the actuarial calculations by the value of the plan assets implies a predicted value for the returns on the plan investments. If the plan invests in equities and other assets are expected to provide some of their returns in the form of holding gains, the interest, dividends, and rental income generated by the plan assets are likely to be lower than this predicted value. The holding gains needed to make up for this shortfall in property income can then be treated as a measure of the value of the holding gains implied by the interest rate assumption, as shown in the following set of equations:

Saving by DB pension plans = property income from plan assets + imputed interest on claim on the employer for the UAL – interest payable on benefit entitlements
= property income from plan assets – (interest rate × plan assets)
= –(implied holding gains on plan assets).

Using holding gains to help fund benefit payments that retirees use for spending does lower national saving, so showing the DB plans that do this as having negative saving is a reasonable way to portray the economic effect of their funding model. Furthermore, if the assumption that the plan assets will generate holding gains is reasonable, then the only way to estimate correctly both the expense to employers of sponsoring pension plans and the income that the plans provide to households is to allow the DB plans to have negative saving.

Nevertheless, accounting for DB pension plans in a way that allows them to have nonzero saving also has disadvantages. First, allowing projecting holding gains on assets held in DB pension plans to enter household income the treatment of holding gains different for assets in DB plans than for assets in DC plans or held directly by households; holding gains on DC plan assets or other assets do not add to household income in any way. Second, because negative saving of DB pension plans results in household interest income that is not paid by business or government, the decomposition of national income by sector will no longer add up to the correct total unless an adjustment for saving by DB pension plans is somehow incorporated. To be consistent with the framework recommended by the 2008 SNA this could be done by adding the negative saving of DB pension plans to the profits of a financial corporation sector, but this decomposition would be hard to follow for most users of the US National Accounts.

To avoid these disadvantages, we will account for the DB pension funds of the United States in a way that makes their saving identically zero. We define the property income received by the households that participate in DB pension plans as equal to the sum of the property income that the plans

obtain from their assets and the imputed interest that the plans receive on their claims on employers for the funding of their UAL. If the plan assets include equities, the property income from the plan assets will usually be less than the income that the assets would earn if they paid the rate of interest assumed in the actuarial calculations by an amount that can be viewed as the holding gains implied by the interest rate assumption. In effect, we exclude expected holding gains used to fund benefit payments from the measure of household income and treat these instead as an implied holding gains component of the change in households' DB pension wealth. This reduces the measure of household saving compared to the one that would result from treating the implied holding gains as the negative saving by DB pension plans.

6.4 Choice of Actuarial Method for Measuring the DB Plans of the United States

6.4.1 Alternative Treatments of Effects of Salary Growth

Two general approaches are possible for estimating the actuarial value of benefit entitlements. Unfortunately, no consensus exists concerning which approach should generally be used in practice, though there is some agreement among national income accountants about the principles that can guide the choice between these approaches. To understand the practical implications of these approaches, it is helpful to consider a typical traditional DB plan benefit formula that makes the benefit equal to final pay (or average pay in the last few years of the career) times the length of the career times a fixed percentage replacement rate. With this kind of formula, salary increases raise the value of the pension, and we can either account for this salary growth effect on an ex post basis, or attempt to incorporate the effect of projected future salary increases into the value of the benefits being earned today.

The ex post approach focuses on the accrued benefit obligation (ABO), which equals the present discounted value of the benefits that would be due to participants if the plan were to be frozen on the valuation date. This approach adheres strictly to the definition of an accrued liability because it excludes benefits that are contingent on future actions by the employer. Under the ABO approach, the value of the benefits earned in a given year ("service cost" or "normal cost") is measured as the increment to the value of benefit entitlements that results from working that year, including both the effect of credit for an additional year of service and the effect of pay raises received during the year. Assuming that the benefit level depends on final pay, the effect of a pay raise on the value of the benefit entitlement will be large for participants who have accumulated credit for many years of service. As a result, the ABO approach tends to produce relatively high

estimates of normal cost in the last years of the career and relatively low estimates of accumulated pension wealth in the early and middle stages of the career. The *average level* of normal costs over the course of the career must be higher if their profile is tilted so that estimates of normal costs are high in the last years of the career because the back loading of normal costs implies that less time is available to accumulate property income. In other words, the ABO approach will tend to produce relatively high estimates of compensation income and relatively low estimates of imputed property income for households.

An alternative to focusing on the accrued-to-date benefit entitlement (as defined by the present value of the benefits that would be due if the plan were to be frozen) is to focus on the benefits that are expected to have been accrued at the time of retirement. To do this, a participant's ultimate level of benefits is projected on the assumptions that the plan will continue in its present form and that the participant will receive future salary increases.

The projected unit credit (PUC) method applies an expected salary growth rate to the benefits earned to date, so in effect its main difference from the ABO method is that it discounts projected benefits by a real rate of interest equal to the assumed nominal rate minus the assumed salary growth rate, not by the nominal interest rate itself. In financial accounting used by private business, this method is often known as the projected benefit obligation (PBO) approach. Allowing for projected future pay increases produces higher estimates of normal cost for employees in the early part of their career than under the ABO approach, and it also produces higher estimates of the value of the benefit entitlement for employees not at the end of the career. (At the end of the career, all the methods agree.) This means that over the career as a whole, more household income from participation in DB plans is attributed to interest and less is attributed to compensation than under the ABO approach.

On the other hand, government-sector employers often want a method that yields an evenly smooth profile of normal costs over the career than occurs with the PUC method. Most government plans in the United States use the entry age normal (EAN) method, which solves for the constant percent of pay that must be contributed to the plan over the course of an employee's career to accumulate the necessary assets at the time of retirement. The EAN method generally implies higher values of pension wealth for participants early in their career than the PUC method, so it is viewed as a conservative funding standard. Yet for national accounts purposes, a key implication of higher measures of pension wealth is that more of the income of the plan participants is attributed to imputed interest income, leaving less to be attributed compensation. Indeed, if employers actually follow the EAN funding schedule, with plan assets earning the assumed rate of return, their contributions can have a lower average over the course of the career than if they use a more delayed schedule for making contributions.

The ABO, PUC, and EAN methods for measuring benefit entitlements are illustrated in box 6.1 at the end of the following section. A number of elaborations of these methods also exist, along with methods that use a different kind of approach that effectively counts projected future increases in contributions as current assets.

6.4.2 Possible Decision Criterion

A criterion for determining whether an ABO approach or a forward-looking approach is more appropriate is whether employees effectively have a secure right to accrue benefits under the plan formula in future years. Models of the option value of pensions developed by Lazear and Moore (1988) and Stock and Wise (1990) imply that besides the benefits that have already been accrued, the right to accrue future benefits is also a valuable asset if the probability of a plan freeze or plan termination is low. This option value is part of the buy-out that would be necessary to induce an employee covered by a defined-benefit pension plan to take early retirement. To agree to retire early, the employee would have to be compensated both for the loss of projected future wages net of the opportunity cost of the employee's time and for the forfeited option to accrue additional benefit rights. (If the employee has reached the point in the life cycle where the value of leisure exceeds the wage, the minimum buy-out necessary to induce the employee to retire early would just be the value of the employee's option to accrue additional benefits.) Because the option value is part of the pension wealth of participants that have the right to accrue future benefits under the existing plan rules, the ABO understates their pension wealth. Smoothing the profile of their wealth accumulation over the career, as is done by forward-looking methods, is therefore reasonable.

In the United States, many private sector sponsors of DB plans have frozen or terminated their plans, depriving participants of the opportunity to accrue additional benefit entitlements. Because neither law nor custom obligates the plan sponsor to give participants future opportunities to accrue benefits, the ABO approach is appropriate for measuring the current pension wealth of private plan participants in the United States. Current government employees in the United States were, on the other hand, traditionally treated as having the right to continue in the same plan until retirement, under the so-called "California rule" (Monahan 2012). Yet in recent years, the taboo against stripping current employees of future opportunities to earn benefits has begun to disappear. In particular, many state and local governments have raised employee contribution rates, and some have announced plans to force their employees into less generous pension plans. In other cases, state and local governments have significantly cut their workforce, so loss of employment has become an additional threat to the opportunity to accrue additional benefit rights for some employees. The facts that once favored a forward-looking approach for state and local government plans have there-

fore become more ambiguous. Nevertheless, a forward-looking approach using either the EAN or PUC method remains justifiable for plans for federal government employees. In addition, the PBO approach is recommended for government employees plans in Europe by the Eurostat-ECB technical compilation guide (2011, 85).

Box 6.1 Example of ABO approach and two PBO methods

In this box a simple hypothetical pension plan illustrates some of the differences between the possible ways of calculating pension benefit liabilities. Three methods are considered: the accrued benefit obligation (ABO) approach, the projected unit credit (PUC) version of the projected benefit obligation (PBO) approach, and the constant percent of pay variant of the entry age normal (EAN) version of the PBO approach. Participants in this pension plan work for three years, retire in the fourth year, and die in the fifth year. Their salary grows 5 percent per period from a starting level of $25,000. Vesting is immediate, there are no breaks in service, and there is no early retirement. The accrued retirement benefit equals 10 percent of salary times the number of periods worked times final salary. The interest rate is 15 percent.

Table 6.4 follows a single participant through the career and retirement. For simplicity, we assume that service cost is measured as of the beginning of the year, so that year one service cost equals the year two opening liability discounted back by one year. The table shows that the PUC and EAN measures of the future benefit liability are higher than the ABO liability except at retirement, when they equal the ABO measure. The PUC and EAN service cost measures are higher than the ABO at first, but are much lower in the last year of the career.

Table 6.5 follows a plan that starts with ten newly hired participants and adds ten new hires in each of the next two years. Hiring then ceases. As the workforce ages, the ABO measure of service cost rises faster than the PUC measure. The EAN measure using the level percent of pay version of the entry age normal method does not rise at all. If the distribution of ages in the workforce is uniform, the ABO measure of service cost is higher than the PUC and EAN, so on the whole the ABO approach tends to attribute the growth of pension wealth more to compensation in the form of imputed contributions (and the other methods tend to it attribute it more to property income in the form of imputed interest earned on the plan's benefit liability).

Table 6.4 **Plan's benefit liability and service cost for a single employee using the ABO approach and two PBO methods**

Assumptions				Liability for future benefits			Service cost			Service cost percent of salary		
Age	Salary	Benefits paid	Accrued benefits	ABO	Projected unit credit	Entry age normal	ABO	Projected unit credit	Entry age normal	ABO	Projected unit credit	Entry age normal
1	25,000	0	0	0	0	—	1,644	1,812	1,979	6.58	7.25	7.92
2	26,250	0	2,500	1,890	2,084	2,276	2,079	2,084	2,078	7.92	7.94	7.92
3	27,563	0	5,250	4,565	4,793	5,008	2,625	2,397	2,182	9.52	8.70	7.92
4	0	8,269	8,269	8,269	8,269	8,269	0	0	0	n/a	n/a	n/a
5	0	0	0	0	0	0	n/a	n/a	n/a	n/a	n/a	n/a

Table 6.5 **Plan's benefit liability and service cost from plan inception to termination using the ABO approach and two PBO methods (dollar amounts in thousands)**

Assumptions				Future benefit liability			Service costs			Service costs percent of payroll			No. of participants	
Year	Payroll	Benefits paid	Accrued benefits	ABO	Projected unit credit	Entry age normal	ABO	Projected unit credit	Entry age normal	ABO	Projected unit credit	Entry age normal	Active	Retired
1	250	0	0	0	0	—	16.4	18.1	19.8	6.6	7.3	7.9	10	0
2	513	0	25	18.9	20.8	22.8	37.2	39.0	40.6	7.3	7.6	7.9	20	0
3	788	0	78	64.6	68.8	72.8	63.5	62.9	62.4	8.1	8.0	7.9	30	0
4	788	83	160	147.2	151.5	155.5	63.5	62.9	62.4	8.1	8.0	7.9	30	10
5	788	83	160	147.2	151.5	155.5	63.5	62.9	62.4	8.1	8.0	7.9	30	10
6	538	83	160	147.2	151.5	155.5	47.0	44.8	42.6	8.7	8.3	7.9	20	10
7	276	83	135	128.3	130.6	132.8	26.3	24.0	21.8	9.5	8.7	7.9	10	10
8	0	83	83	82.7	82.7	82.7	0	0	0	n/a	n/a	n/a	0	10

6.5 Estimates of Income and Saving from DB Pension Plans in the United States

6.5.1 Private Plans

Our measures of US household income and saving from participation in private DB plans are calculated from a database of pension plan tax returns (IRS Form 5500). In this database missing values are common for some variables (particularly dividend and interest income on plan assets), and comparisons of the population of filers in successive years imply that significant numbers of plans are missing in 2000–2002, even though the data are supposed to be a census of all private plans in the United States. We therefore include imputations for missing values of key variables and for missing plans in 2000–2002 in our estimates of national totals, as described in Reinsdorf and Lenze (2009, 55).

Under the cash approach, households' compensation income from participation in DB plans is measured by employer contributions, and their property income is measured by the interest, dividends, and rental income earned by plan assets. On average over the years 2000–2007, employer contributions are almost $80 billion per year and property income is almost $58 billion per year, so the cash measure of household income is $137.6 billion. After subtracting administrative expenses of around $8 billion, the cash measure household saving averages almost $130 billion per year (table 6.6). The accrual measure of household saving from participation in these plans averages just $8 billion more, with employer-imputed contributions averaging about $2 billion and employer-imputed interest payments on the UAL averaging about $6 billion. Using actuarial measures, therefore, has a trivial effect on the average level of household income and saving in the case of private plans.

On the other hand, using the actuarial approach greatly reduces the volatility of household income from employer contributions and also from all sources combined. For example, after including employer-imputed contributions, the accrual measure of compensation income from participation in private DB plans rises from $73.1 billion in 2000 to $81.9 billion in 2002. Yet in 2000 a nearly unprecedented streak of five good years of stock market returns had left many plans overfunded, so employer contributions to private DB plans were only $32.8 billion.[14] Two years later, after the dot-com stock market crash and bear market, beginning-of-year assets were down by over 250 billion dollars and contributions rebounded to 100.2 billion dollars.

14. Reinsdorf (2007, 9) finds that before the bull market of 1995–2000, cash saving by private and government DB pension plans was adding about 1.6 percentage points to the personal saving rate, compared with zero in 2000.

Table 6.6 **Household income, saving and wealth from private defined-benefit pension plans: ABO actuarial approach (billions of US dollars except as noted; years defined by plan year-ending date)**

	2000	2001	2002	2003	2004	2005	2006	2007
Household income	**122.1**	**130.6**	**143.0**	**156.5**	**143.8**	**150.6**	**152.7**	**165.7**
Employer contributions to DB plans	73.1	77.0	81.9	82.8	78.8	82.9	85.6	89.3
Actual contributions	32.8	52.2	100.2	100.8	95.4	92.7	89.2	74.8
Imputed contributions	40.3	24.8	–18.3	–18.0	–16.6	–9.8	–3.6	14.5
Imputed employer payment of interest on UAL	–14.3	–4.4	12.0	24.8	11.2	10.6	3.4	7.4
Property income from plan assets	63.3	58.0	49.1	48.9	53.8	57.1	63.7	69.0
LESS: Plan administrative expenses	**7.3**	**7.2**	**6.9**	**7.4**	**8.3**	**8.6**	**9.2**	**9.9**
Household saving	**114.8**	**123.4**	**136.1**	**149.1**	**135.5**	**142.0**	**143.5**	**155.8**
Implied holding gains on plan assets	**57.4**	**57.1**	**56.2**	**50.6**	**62.9**	**69.2**	**71.4**	**71.9**
Current change in household wealth	**172.2**	**180.5**	**192.3**	**199.7**	**198.4**	**211.2**	**214.9**	**227.7**
Benefits and withdrawals	118.2	124.5	134.8	135.7	141.9	139.8	152.7	161.5
Change in benefit entitlements	54.8	56.7	58.6	64.9	57.3	72.4	63.2	67.2
Less: Employee contributions	0.8	0.7	1.1	0.9	0.8	1.0	1.0	1.0
Employer expenses	**58.8**	**72.6**	**93.9**	**107.6**	**90.0**	**93.5**	**89.0**	**96.7**
Of which, imputed expenses	26.0	20.4	–6.3	6.8	–5.4	0.8	–0.2	21.9
ABO, BOY	**1,773.9**	**1,844.6**	**1,954.4**	**2,071.3**	**2,130.9**	**2,282.0**	**2,309.1**	**2,472.4**
Plan net assets, BOY	**2,011.7**	**1,918.4**	**1,755.0**	**1,657.6**	**1,944.7**	**2,105.8**	**2,249.7**	**2,474.3**
Unfunded actuarial liability	**–237.8**	**–73.8**	**199.4**	**413.7**	**186.2**	**176.2**	**59.4**	**–1.9**
Change in ABO at 6% rate	**70.7**	**109.8**	**116.9**	**59.5**	**151.1**	**27.1**	**163.3**	**NA**
Of which, changes in assumptions and plan rules	15.9	53.1	58.3	–5.4	93.8	–45.3	100.1	**NA**
Change in plan net assets	**–93.3**	**–163.4**	**–97.4**	**287.1**	**161.1**	**143.9**	**224.6**	**178.5**
Of which, holding gains, capital transfers, and other changes in volume of assets	–64.7	–142.6	–106.1	279.6	161.3	141.5	232.6	205.1
Change in unfunded actuarial liability	**164.0**	**273.2**	**214.3**	**–227.6**	**–10.0**	**–116.8**	**–61.3**	**NA**

Source: Authors' estimates from IRS form 5500 data, except change in plan assets in 2007, which comes from Private Pension Plan Bulletin Historical Tables and Graphs, Employee Benefits Security Administration, March 2012.

The current change in household wealth equals employer contributions plus the interest on the benefit entitlement minus plan administrative expenses. As was explained in section 6.3.3, the difference between the interest on the benefit entitlement and the property income received by the plans (both imputed and actual) represents implied holding gains on plan assets. These implied holding gains average about $62 billion, about the same as the change in benefit entitlements. Because the private DB plans tend be offered by established businesses with stagnant or shrinking workforces, a large fraction of their participants are retired. Benefit payments are thus so high that virtually all of the plans' accrued property and contribution income is used for benefits or administrative expenses. Indeed, on a cash basis, saving of the pension plans themselves averages –9 billion dollars per year.

On the other hand, holding gains, which range from –142.6 billion dollars in 2001 to 279.6 billion dollars in 2004, are sufficiently positive to bring the average growth in plan assets up to about 80 billion dollars per year, or 66 billion dollars in 2007, which was estimated based on EBSA Bulletins, is excluded. Although average holding gains would have been lower had 2008 been included, at least for the years covered by table 6.6, holding gains contributed even more to asset growth than the holding gains implied by the calculation of the change in the benefit entitlement.

Households are often found to have low marginal propensities to consume out of holding gains (3 percent is a typical estimate), but in the case of private DB plans, holding gains are a close substitute for ordinary income as a source of funding for benefits. Indeed, government regulations against both deliberate overfunding and underfunding of DB pension plans tend to cause employer contributions to vary inversely with holding gains. Thus, holding gains on assets are used more frequently to fund consumption expenditures of US households when the assets are held by a DB pension plan than when the assets are held by households directly.

6.5.2 State and Local Government Plans

The DB plans for employees of state and local governments cover fewer active participants than private plans (14.3 million in 2007, compared with 18.5 million in nonfrozen private DB plans), but they generate about the same amount of income for households as the private DB plans if income is measured on a cash basis. The cash measure of household income (employer actual contributions plus property income from plan assets) averages $139 billion for state and local government plans (table 6.7). One reason for this seeming generosity of the state and local plans is that several million of the participants in these plans are not covered by Social Security, so their benefits have to be high enough to make up for the lack of Social Security benefits. Another is that retirement eligibility occurs at younger ages (often in the late fifties) for many state and local government employees in jobs such

Table 6.7 **Household income, saving and wealth from state and local government DB pension plans using the ABO approach.[a] (Billions of dollars, or as noted)**

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Household income	**183.3**	**188.1**	**209.1**	**244.2**	**246.2**	**265.0**	**287.2**	**297.0**	**294.0**
Employer contributions to DB plans	136.2	143.9	147.9	148.4	161.9	171.2	179.3	193.7	202.2
Actual contributions	39.6	39.2	42.1	56.4	55.8	61.9	67.2	75.2	82.5
Imputed contributions	96.5	104.8	105.9	91.9	106.1	109.3	112.2	118.5	119.7
Imputed employer payment of interest on UAL	–37.9	–26.8	–9.0	17.9	1.7	10.2	17.8	10.3	14.5
Property income from plan assets	85.1	71.0	70.2	77.9	82.6	83.6	90.1	93.0	77.4
LESS: Plan administrative expenses	**4.8**	**7.2**	**7.8**	**7.7**	**7.9**	**10.3**	**10.2**	**15.3**	**13.8**
Household saving	**178.6**	**180.9**	**201.3**	**236.6**	**238.3**	**254.7**	**277.0**	**281.8**	**280.3**
Implied holding gains on plan assets	**56.5**	**69.5**	**64.9**	**40.5**	**49.2**	**60.6**	**61.9**	**80.6**	**104.0**
Current change in household wealth	**235.1**	**250.3**	**266.2**	**277.0**	**287.4**	**315.3**	**338.9**	**362.3**	**384.2**
Benefits and withdrawals	100.3	110.0	121.3	132.6	141.7	151.0	162.1	174.0	186.1
Change in benefit entitlements	160.5	167.4	173.4	174.5	176.7	196.2	210.2	223.8	236.2
Less: Employee contributions	25.7	27.1	28.5	30.1	30.9	31.8	33.4	35.5	38.1
Employer expenses	**98.3**	**117.1**	**139.0**	**166.3**	**163.6**	**181.4**	**197.1**	**204.0**	**216.6**
Of which, imputed expenses	58.6	77.9	96.9	109.9	107.8	119.6	129.9	128.8	134.2
ABO, BOY	**1,728.4**	**1,892.8**	**2,100.7**	**2,272.6**	**2,426.3**	**2,807.5**	**3,086.6**	**3,344.5**	**3,560.8**
Plan net assets, BOY	**2,360.2**	**2,340.3**	**2,250.3**	**1,973.5**	**2,396.0**	**2,621.3**	**2,763.4**	**3,156.6**	**3,297.9**
Unfunded actuarial liability	**–631.8**	**–447.4**	**–149.5**	**299.0**	**30.3**	**186.2**	**323.2**	**187.9**	**262.8**
Change in ABO	**164.5**	**207.9**	**171.8**	**153.7**	**381.2**	**279.1**	**257.9**	**216.3**	**226.6**
of which, changes in assumptions and plan rules	4.0	40.5	–1.6	–20.8	204.6	82.9	47.7	–7.5	–9.6
Change in plan net assets	**–20.0**	**–90.0**	**–276.7**	**422.4**	**225.3**	**142.2**	**393.1**	**141.4**	**–883.3**
of which, holding gains, capital transfers, and OCVA	–65.3	–110.0	–288.4	398.2	205.6	126.1	374.8	127.0	–881.3
Change in unfunded actuarial liability	**184.4**	**297.9**	**448.6**	**–268.7**	**155.9**	**136.9**	**–135.2**	**74.9**	**1,109.9**

Note: Flows are measured for years ending on December 31; stocks are measured as of December 31.

[a] Assumed interest rate in actuarial calculations is 6 percent from 2000 to 2004 and 5.5 percent thereafter.

as police, firefighter, or teacher. However, the effects of high benefits and early retirement ages on employer pension expenses are partly offset by relatively large employee contributions, which average over $30 billion per year.

On the whole, employer actual contributions to state and local government do not respond as dramatically to changes in plan funding status as is the case for private plans, though when the plans became underfunded in 2003, actual employer contributions increased. Thus, in this instance, imputed contributions had a more modest effect on the volatility of household income. Another noteworthy effect of the 2003 drop in plan assets is a $26.9 billion rise in imputed interest on the UAL that is offset by a $24.4 billion dip in implied holding gains. Household income was actually more volatile in 2003 under the actuarial approach than under the cash approach because imputed interest on the UAL was included in household income, but not implied holding gains. (This source of volatility is avoided by the SNA 2008 approach, which includes in interest income of households the amounts that we treat as implied holding gains.)

Yet the most important finding in table 6.7 is that imputed employer contributions have a large effect on the level of household income. Imputed contributions average over $107 billion in 2000–2008 and account for nearly half of the average level of household saving from participation in these plans, which is $236.6 billion. The weak response of employer contributions to plan-funding shortfalls and the low level of these contributions compared to the actuarial estimates of employer service costs is possible because the plans are not subject to the same tax and regulatory constraints as private plans. Another factor that helps to keep the level of actual contributions low is that state and local government plan actuaries tend to assume a high rate of interest, often 8 percent. For example, Moody's (2012, 6) estimates that lowering the discount rate assumption from 8 percent to its preferred assumption of 5.5 percent would increase a representative plan's accrued actuarial liability by 35.6 percent.

The financial soundness of DB pension plans sponsored by state and local governments has recently become a topic of controversy, with arguments that these plans are assuming rates of interest that are too high featuring prominently in this debate. The state and local government plans justify their high interest rate assumptions as the expected rate of return on the stocks that they hold, but Brown and Wilcox (2009) argue that using expected rate of return of risky assets to discount plan liabilities is inappropriate and prefer to use Treasury bond interest rates. Treasury bond rates are too low for actuarial purposes, however, as these bonds are sometimes held for liquidity or collateral requirement reasons rather than for their yield. Also, the actuarial liabilities of state and local government plans no longer seem as risk free as they seemed to be when Brown and Wilcox wrote their paper. One alternative is to use the interest rate assumptions that the PBGC uses to value its benefit obligation, which are based on surveys of rates offered on annui-

ties purchased from life insurers. Those rates allow the PBGC to calculate market values of annuities equivalent to the benefits due to DB plan participants, and are typically slightly higher than Treasury bond rates. However, for US National Accounts purposes, adoption of the mean interest rate that the private plans are required to use for tax and regulatory purposes on Schedule B of Form 5500 has the advantage of a unified approach to state and local government and private DB plans. This interest rate is based on high-grade corporate bonds. Our interest assumption for actuarial estimates of the state and local government plans is therefore 6 percent in 2000–2004 and 5.5 percent thereafter.[15]

Using these rate assumptions, employer expense for imputed interest on the UAL averages about zero, but that is because the plans were overfunded on an ABO basis (though not using the EAN method) in 2000–2002. The financial crisis caused an extremely large holding loss in 2008, and property income from assets also declined in that year. At the same time, the ABO grew by $226.6 billion, and the gap between the change in assets and the change in the ABO resulted in an increase in the UAL of $1.1 trillion. Thus, employer interest on the UAL will likely be positive and substantial going forward. The large capital loss of 2008 also changed the average level of holding gains over a period starting in 2000 from +96 billion dollars per year to –12.6 billion dollars per year. In contrast, the change in the value of the benefit entitlement attributed to implied holding gains averages $60 billion per year over 2000–2007 and $65 billion per year over 2000–2008. In most years, virtually all of the change in plan assets comes from holding gains and losses, as the cash inflows to the state and local government plans from contributions and property income on assets barely exceed the cash outflows for benefits and administrative expenses.

6.5.3 Federal Government Employee Plans

Except for some inflation-indexed TIPS (Treasury Inflation-Protected Security) bonds bought by the military plan, the main DB plans for federal government employees do not invest in assets that generate holding gains. We therefore exclude implied holding gains from our treatment of these plans. In addition, our estimates cover only the two main federal DB plans (Civil Service Retirement System [CSRS] and Federal Employee Retirement System [FERS]) and the main military plan. The excluded smaller federal

15. On July 2, 2012, Moody's Investors Service also announced a plan to use interest rates on high-grade corporate bonds to value actuarial liabilities of state and local government plans. Novy-Marx and Rauh (2010) find in a study of state government plans that replacing the plans' interest rate assumptions with tax-adjusted interest rates on state general obligation municipal bonds raises the estimate of the aggregate ABO in 2009 from $2.76 trillion to $3.20 trillion. Using Treasury bond rates raises the estimate to $4.43 trillion. The EAN method estimate using the interest rate assumption of 8 percent is $3.15 trillion, so in this particular case, the effect of adopting the ABO approach instead of the EAN method used by the plans is about the same as the effect of using the states' tax-adjusted borrowing rate.

plans account for less than 5 percent of the total DB pension benefit payments of the federal government. We account for the federal plans using the EAN method for actuarial calculations because the available actuarial reports for these plans use the EAN method. The nominal interest assumptions used by the federal plan actuaries are high compared with our assumptions in tables 6.6 and 6.7 of 6 percent in 2000–2004 and 5.5 percent thereafter (bottom panel of table 6.8). The federal actuaries' salary growth and inflation assumptions are also high, however, and it is the real interest assumption (generally around 2.5 percent) that drives the federal actuarial estimates.

For the main federal plans, employer contributions per active participant are quite high, with a range from 16,000 to 28,000 dollars per year, or roughly 33 percent of covered payroll. Higher benefit levels to compensate for the lack of social security in the older civilian retirement plan and the military plan and the early retirement ages of the military plan explain some of the difference between these employer contributions and those for private DB plans (which are typically around or below 5,000 dollars). Yet the large employer contributions per active employee for the federal plans are primarily an example of what happens when an underfunded DB plan reaches maturity. Federal employee plans have high numbers of retired participants, so their benefit payments, which average $91.4 billion over the years covered by table 6.8, are much higher than employer normal cost for benefits earned by active participants, which average only $34.7 billion. Returns on assets would fund most of the benefit expenses of a fully funded, mature plan with a high ratio of retired to active participants, but the federal plans are only about 40 percent funded because they have never been able to close the funding gap inherited from their historical operation as pay-as-you-go plans. As a result, only 45 percent of employer actual contributions are used to cover normal cost for active employees. This means that the cash approach to measuring DB pension plans overstates current employee compensation by an average of $44.8 billion over the period covered by table 6.8, as shown by averaging the imputed employer contributions and reversing the sign.

The largest component of the actual federal contributions is the amount paid toward the cost of interest on the UAL. Paying a large fraction of the interest accruing on the UAL keeps it from growing rapidly. However, the interest cost of the UAL exceeds imputed employer contributions by an average of about $36 billion. Household income from participation in federal DB plans is therefore higher under the actuarial approach than under the cash approach, even though compensation income is lower.

6.5.4 Combined Actuarial Estimates for All DB Plans

Expressing the combined figures for private, state, and local government and federal government plans as a percent of disposable personal income (DPI) from the NIPAs shows that participation in DB plans provides income

Table 6.8 **Household wealth and income from the main federal government DB pension plans. PBO approach using interest, inflation, and salary growth rates assumed in plans' actuarial reports (billions of dollars, except as noted)**

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Household income	**143.9**	**149.0**	**151.1**	**157.1**	**162.9**	**171.3**	**173.7**	**180.1**	**185.2**
Employer contributions to DB plans	28.2	28.8	31.5	33.0	34.1	37.7	37.7	39.3	42.3
Actual contributions	64.2	65.8	69.7	68.1	74.4	81.1	85.8	91.4	114.9
Imputed contributions	–36.0	–37.0	–38.2	–35.1	–40.3	–43.4	–48.1	–52.1	–72.6
Imputed employer payment of interest on UAL	69.2	71.7	71.2	77.1	82.9	86.5	87.2	93.1	90.0
Property income from plan assets	46.5	48.5	48.5	47.0	45.9	47.1	48.9	47.6	52.9
LESS: Plan administrative expenses	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**	**0.2**
Household saving	**143.8**	**148.9**	**151.0**	**157.0**	**162.8**	**171.2**	**173.6**	**179.9**	**185.0**
Benefits and withdrawals	78.0	81.2	83.7	85.5	88.8	93.2	98.6	104.4	109.0
Change in benefit entitlements	70.6	72.1	71.5	75.8	78.2	82.1	78.9	79.3	79.8
Less: Employee contributions	4.7	4.3	4.2	4.3	4.2	4.1	3.9	3.8	3.7
Employer expenses	**97.4**	**100.5**	**102.6**	**110.1**	**117.0**	**124.2**	**124.8**	**132.5**	**132.3**
Of which, imputed expenses	33.2	34.7	32.9	42.0	42.6	43.1	39.0	41.1	17.4
PBO, BOY	**1,800.8**	**1,871.4**	**1,943.5**	**2,015.0**	**2,090.9**	**2,169.1**	**2,251.2**	**2,330.1**	**2,409.4**
Plan net assets, BOY	**642.8**	**684.2**	**717.4**	**756.0**	**789.7**	**825.1**	**863.8**	**903.3**	**924.6**
Unfunded actuarial liability	**1,158.0**	**1,187.2**	**1,226.1**	**1,259.0**	**1,301.2**	**1,344.0**	**1,387.4**	**1,426.8**	**1,484.8**
Change in PBO	**70.6**	**72.1**	**71.5**	**75.9**	**78.2**	**82.1**	**78.9**	**79.3**	**79.8**
of which, assumption changes or other changes in plans	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Change in plan net assets	**41.4**	**33.2**	**38.6**	**33.7**	**35.4**	**38.7**	**39.5**	**21.3**	**62.2**
of which, capital transfers and timing differences	**4.1**	**–4.1**	**0.0**	**–0.1**	**–0.2**	**–0.3**	**–0.4**	**–16.9**	**–0.1**
Change in unfunded actuarial liability	**29.2**	**38.9**	**32.9**	**42.2**	**42.8**	**43.4**	**39.4**	**58.0**	**17.6**
Assumptions (%):									
Interest rate assumption, civilian plans	7.00	6.75	6.75	6.25	6.25	6.25	6.25	6.25	6.25
Inflation assumption, civilian plans	4.00	3.75	3.75	3.25	3.25	3.25	3.50	3.50	3.50
Rate of salary growth, civilian plans	4.25	4.25	4.25	4.00	4.00	4.00	4.25	4.25	4.25
Interest rate assumption, military plans	6.25	6.25	6.25	6.25	6.25	6.25	6.00	6.00	5.75
Inflation assumption, military plans	3.00	3.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Rate of salary growth, military plans	3.50	3.50	3.50	3.75	3.75	3.75	3.75	3.75	3.75

Note: Estimates exclude smaller federal plans and the plan for employees of the Board of Governors of the Federal Reserve.

to households falling between 6.1 and 6.3 percent of DPI in most years (table 6.9). From an accounting point of view, these plans therefore add 6.1 percentage points to the personal saving rate on average. However, subtracting benefits payments net of employee contributions shows that personal saving in the form of growth in pension-plan equity amounts to only 2.3 percent of DPI on average. In addition, the imputed portion of employer pension expenses averages 1.7 percent of DPI, so the cash measure of personal saving from participation in DB plans averages just 4.4 percent of DPI and the cash measure of growth in pension plan equity averages just 0.6 percent of DPI. Finally, the SNA 2008 measure of household saving would count the amount that we treat as imputed holding gains as part of household-imputed interest income, which would raise the measure of household saving from participation in DB plans to an average of 7.5 percent of DPI, and raise the measure of growth in DB plan equity including household saving to an average of 3.7 percent of DPI.

Imputed employer expenses for contributions and interest subtract the same amount from saving by employers as the 1.7 percent of DPI that they add to household saving. Most of the subtraction comes from imputed employer contributions for state and local government plans, and the total average subtraction from saving by state and local governments (which have average saving of about zero in the present version of the national accounts) amounts to 1.2 percent of DPI. Imputed interest paid by the federal government to its DB plans averages 0.9 percent of DPI, which is partially by imputed employer contributions averaging –0.5 percent of DPI. Finally, imputed pension plan expenses for private employers are a relatively trivial 0.1 percent of DPI.

6.5.5 Social Security in the United States

Sections 6.5.1 to 6.5.4 have illustrated the changes that the United States may make in its presentation of employer-sponsored DB plans. The United States has not yet developed a plan to publish supplementary actuarial information on Social Security, but US Social Security Administration actuaries calculate three kinds of actuarial measures of Social Security's benefit obligation. The "open group" unfunded liability is a measure of the plan's long-run solvency. The "closed group" liability is useful for analyzing intergenerational burden sharing. The "maximum transition cost" is useful for analyzing the cost of proposals to replace Social Security with some other system, such as individual accounts, while letting participants keep the Social Security benefits that they have already earned (Schultz and Nickerson 2010). It is therefore an ABO-type measure of benefit entitlements.

Even though ABO measures are well suited to measuring employer-sponsored pension plans for national accounts purposes, their meaningfulness is less clear when it comes to social security. In sharp contrast to most traditional DB pension plans, for Social Security the ABO measure

Table 6.9 **Household income from DB pension plans: US totals using the actuarial approach[a] (percentages of disposable personal income)**

	2000	2001	2002	2003	2004	2005	2006	2007
Household income	**6.1**	**6.1**	**6.3**	**6.7**	**6.2**	**6.3**	**6.2**	**6.2**
Employer contributions to DB plans	3.2	3.3	3.3	3.2	3.1	3.1	3.1	3.1
Actual contributions	1.9	2.1	2.6	2.7	2.5	2.5	2.4	2.3
Imputed contributions	1.4	1.2	0.6	0.5	0.6	0.6	0.6	0.8
Imputed employer payments of interest on UAL	0.2	0.5	0.9	1.4	1.1	1.2	1.1	1.1
Property income from plan assets	2.7	2.3	2.1	2.1	2.1	2.0	2.0	2.0
LESS: Plan administrative expenses	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
Household saving	**6.0**	**5.9**	**6.1**	**6.5**	**6.0**	**6.1**	**6.0**	**5.9**
Implied holding gains on plan assets	**1.6**	**1.7**	**1.5**	**1.1**	**1.3**	**1.4**	**1.3**	**1.5**
Current change in household wealth	**7.5**	**7.6**	**7.6**	**7.6**	**7.3**	**7.5**	**7.3**	**7.4**
Benefits and withdrawals	4.0	4.1	4.2	4.2	4.2	4.1	4.2	4.2
Less: Employee contributions	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Change in benefit entitlements	3.9	3.9	3.8	3.8	3.5	3.8	3.6	3.6
Employer expenses	**3.5**	**3.8**	**4.2**	**4.6**	**4.2**	**4.3**	**4.1**	**4.2**
Of which, imputed	**1.61**	**1.74**	**1.54**	**1.89**	**1.63**	**1.76**	**1.70**	**1.84**
Private plans	0.35	0.27	–0.08	0.08	–0.06	0.01	0.00	0.21
State and local government plans	0.80	1.02	1.21	1.31	1.21	1.29	1.31	1.24
Federal plans	0.45	0.45	0.41	0.50	0.48	0.46	0.39	0.39
Addendum:								
Household income, cash approach	**4.5**	**4.4**	**4.7**	**4.8**	**4.6**	**4.6**	**4.5**	**4.3**
Household benefit entitlement, BOY	**72.4**	**73.3**	**74.9**	**75.9**	**74.8**	**78.2**	**77.1**	**78.2**
of which, changes in assumptions or plan rules and OCVA	**0.3**	**1.2**	**0.7**	**–0.3**	**3.4**	**0.4**	**1.5**	**0.0**
Plan net assets, BOY	**68.4**	**64.6**	**59.0**	**52.4**	**57.7**	**59.8**	**59.3**	**62.7**
of which, holding gains/losses, capital transfers and OCVA	**–1.7**	**–3.4**	**–4.9**	**8.1**	**4.1**	**2.9**	**6.1**	**0.0**
Unfunded actuarial liability	**2.2**	**7.1**	**14.3**	**21.5**	**15.1**	**17.2**	**16.9**	**15.2**
Change in benefit entitlement	**4.2**	**5.1**	**4.5**	**3.5**	**6.9**	**4.2**	**5.0**	**2.8**
Change in plan net assets	**–1.0**	**–2.9**	**–4.2**	**8.9**	**4.8**	**3.5**	**6.6**	**1.6**
Change in unfunded actuarial liability	**5.2**	**7.8**	**8.3**	**–5.5**	**2.8**	**0.9**	**–0.9**	**1.5**
Memo: Disposable personal income	**7,327**	**7,649**	**8,010**	**8,378**	**8,889**	**9,277**	**9,916**	**10,424**

[a]Smaller federal government plans and terminated private DB plans are excluded.

of benefit entitlements tends to rise quickly in the early part of the career because Social Security's benefit formula is highly progressive and uses career average pay instead of final pay. Thus, even if lifetime contributions equal lifetime benefits in present-value terms for every participant, Social Security would look underfunded using an ABO approach. Furthermore, active participants cannot easily escape from future obligations to contribute, so an evaluation of their position that includes projected future benefits but not projected future contributions is of limited usefulness. This suggests that the closed group liability would be better suited for national accounts purposes than the other measures produced by the Social Security actuaries.

6.6 Alternative Measures of Household Saving in France based on the SNA Treatment of Pensions and Social Security

The particular changes that a country will need to make in its national accounts to implement the SNA 2008 recommendations depend on its economic institutions. France has some private retirement plans that are managed by life insurance companies as social insurance. To comply with the 2008 SNA, these plans may be treated as employer-sponsored DC pension plans. We show the current treatment of these plans and the possible new treatment of these plans in appendix A (table 6A.1). In the new treatment, employer contributions to these plans are recorded as compensation rather than as purely financial transactions, which raises the measure of household saving in 2007 by 10.3 billion euros.

By far the largest component of the French retirement system is, however, social security and the web of government-sponsored plans that are linked to social security. For these plans, the new actuarial measures of the 2008 SNA will be shown as part of a supplementary table that shows benefit entitlements in all pension and social security plans, not in the core accounts. In table 6A.2 in appendix A, we illustrate the differences between the core accounts and the supplementary table using data for France and estimates of benefit entitlements from social security and government-sponsored pension plans that we calculated using PROST, a social security modeling program of the World Bank that calculates accrued-to-date liabilities. Because the treatment of social security in the supplementary table is supposed to parallel the treatment of DB pension plans in the core accounts, in this table we call the difference between the actuarial value of benefits accrued through service and actual contributions "employer-imputed social contributions." In addition, we record the interest accruing on the social security benefit entitlement as household contribution supplements and as negative saving by the plan. Recording negative saving by the plan is appropriate because a social security plan with a funding gap does not have a claim on employers to cover this gap.

In the core accounts, saving by households equals the benefits received net

of employee contributions, or 159 billion euros, but in the supplementary table, household saving equals the sum of employer contributions (€126 billion), imputed contributions (€31 billion) and imputed interest on the benefit entitlement (€287 billion), or €444 billion. This amount can also be decomposed into net benefits and the change in the benefit entitlement (household reserves in pension funds) of €285 billion.

6.6.1 International Comparison of France and the United States

The supplementary table on DB pension plans and social security that was introduced in the 2008 SNA will make it possible to calculate comprehensive measures of household income and saving that can be compared across countries with different retirement systems. Yet before accounting for differences in retirement systems, an international comparison must first account for other differences in the role of government in the economy (Durant and Frey 2009). To do this, we adjust household disposable income to include the value of social transfers in kind of government services for individual consumption, which consist mainly of education and health care. The unadjusted measure of disposable income is lower when these services are financed by income taxes than when they are purchased directly by households (Audenis, Grégoir, and Louvot 2002; Harvey 2004), but an international comparison should be invariant to how these services are financed. In the United States, the value of individual consumption items furnished by government is about 8.5 percent of disposable household income, whereas in France their value is 27 percent of disposable household income.[16] Thus, the use of a lower denominator is one reason why the headline household saving rate of France tends to be much higher than that of the United States. In addition, the headline saving rate is gross of consumption of fixed capital (CFC) in France but net of CFC in the United States. Our starting point for comparing saving rates of the United States and France is therefore adjusted disposable household income net of CFC, shown for 2007 at the top of table 6.10.

The next part of table 6.10 corrects the initial measures of adjusted disposable household income to implement the recommendations of the 2008 SNA on employer-sponsored pensions in the core account. In the case of the United States, the correction consists of adding imputed employer contributions to DB pension plans and the difference between the interest accruing on the benefit entitlement and actual property income from plan assets. This difference equals the sum of imputed interest on the claim of the plans on the employer for unfunded benefit entitlements and the implied holding gains of plan assets shown in tables 6.6, 6.7, and 6.8. Including imputed employer contributions to DB plans and the SNA measures of imputed

16. See table 102 of the accounts for international comparisons at http://www.bea.gov/national/sna.htm.

Table 6.10 **Household saving and wealth including the measures from the supplementary table on pensions and social security of the 2008 SNA: Comparison of the United States and France in 2007[a] (billions of local currency unless otherwise stated)**

	United States	France
Household disposable income and saving		
Adjusted household disposable income[b]	**11,313**	**1,491**
Household saving as percent of adjusted disposable income	**2.2**	**9.6**
"Correction" of treatment of pension plans	**344**	**10**
Imputed employer contributions to DB pension plans	81	
Imputed property income and implied holding gains, DB plans	263	
Actual employer contributions to DC pension plans	10	
Corrected household income	**11,657**	**1,501**
Corrected household saving as percent of corrected income	**5.1**	**10.2**
Effect of actuarial treatment of social security[c]	**1,732**	**285**
Actual employer contributions	310	126
Actual contributions from employees and self-employed persons	360	72
Imputed contributions from government	–148	31
Actual and imputed property income	1,731	287
LESS: Benefits	521	231
Harmonized household disposable income	**13,390**	**1,786**
Household saving as percent of harmonized disposable income	**17.4**	**24.5**
Balance sheet, in years of harmonized disposable income		
Core accounts, current methods:		
Assets	**5.9**	**6.0**
Nonfinancial assets	1.9	3.9
of which, real estate	1.6	3.5
Financial assets	4.0	2.1
of which, from life insurers and pension funds	1.1	0.7
Liabilities	**1.0**	**0.6**
Adjustments including in harmonized balance sheet	**1.7**	**3.2**
Unfunded benefit entitlements in DB pension plans	0.1	
Benefit entitlements in social security plans	1.7	4.1
LESS: Financing gap of social security	0.1	0.9
Total harmonized assets[d]	**7.5**	**9.2**
Total harmonized net worth	**6.5**	**8.6**

[a] Baseline income and saving estimates reflect national accounts data as published in 2010.

[b] Net of consumption of fixed capital (CFC). Nonprofit institutions serving households are included with households in estimates for the United States.

[c] Social security includes civil servant pension plans in the case of France.

[d] Totals.

property income raises the measure of the US household saving rate from 2.2 percent of adjusted disposable income to 5.2 percent of corrected disposable income. In the case of France, the "correction" consists of adding actual employer contributions to DC pension plans administered by life insurance companies. For France, the impact of the reclassification as social insurance

of pensions currently recorded in life insurance is modest, at only 0.6 percentage points, because the value of these pensions is small (1.3 percent of households' total assets). Thus, correcting the measurement of household saving arising from participation in employer-sponsored pension plans helps to close the large gap between household saving rates of the United States and France.

We next convert the corrected measures of household income and saving into "harmonized" measures by changing the treatment of social security and similar government-employee pension plans from the standard treatment used in the core accounts to one based on the actuarial measures of the supplementary table. Household disposable income from social security in the core accounts equals benefits received less employee contributions, while in the supplementary table it comprises actual and imputed employer contributions and interest on the benefit entitlement. The difference between the two income concepts therefore equals total contributions plus interest on the benefit entitlement minus benefits received.

To make comparable estimates of benefit entitlements from social security for the United States and France we used PROST, a social security modeling program of the World Bank that calculates accrued-to-date liabilities. For comparison purposes, we used the same nominal discount rate, 4 percent, for both countries (see appendix B for more details). We did not include railroad retirement in the adjustment for Social Security in the United States because the effect of substituting an actuarial measure of railroad retirement for a cash measure is tiny in recent years.

The harmonized saving rates are much higher than the corrected saving rates in both the United States and France because the imputed interest on benefit entitlements is very large. In the United States, the "harmonized" saving rate with an actuarial treatment of Social Security is 17.4 percent. The amounts of social security benefit entitlements (including those of civil servants) in France are even larger than in the United States; indeed, the property income accruing to households at our assumed 4 percent rate amounts to 16 percent of their "harmonized" disposable income. This helps to bring the harmonized household saving rate for France up to 24.5 percent. Nevertheless, the gap between harmonized saving rates of 7.1 percentage points is smaller than the original gap between the adjusted saving rates.

Despite their higher saving rate, French households had about the same ratio of assets to harmonized disposable income as US households on the eve of the financial crisis of 2008. The total assets of US households recorded in the Flow of Funds Accounts amounted to around 5.9 years' worth of harmonized disposable income, compared with assets worth six years of disposable income for French households (bottom panel of table 6.10). In the United States, the financial assets are larger, while French households rely more on real estate, which in France has tended to be relatively stable. Strong holding gains in many of the years from 1995 to 2006 are one factor

that enabled US households to build assets while having comparatively low saving. Households in the United States also seem to have made more use of leverage to finance asset purchases, as their liabilities are relatively high. Subtracting liabilities implies a lower net worth figure for US households before benefit entitlements of 4.9 years of income, compared to 5.4 years of income in France.

To arrive at corrected and harmonized measures of household wealth, we add the value of unfunded benefit entitlements from the DB pension plans of the United States and total benefit entitlements from social security. We also deduct an allowance for the financing gap of the social security plan because we do not want to count benefits that might not be paid as part of social security wealth. For France, our estimates of the benefit entitlement and the funding gap include the effect of the 2010 reform increasing the minimum retirement age to sixty-two, which brought the present discounted value of the financing gap down from 29 percent of benefit entitlements to 26 percent.[17] The social security funding gap reflects the reductions in benefits or increases in contribution rates that are projected, based on the information available at the time of the projection, to be necessary to keep the system solvent. In assigning all of the funding gap liability to households that are currently alive we are making a conservative assumption: future generations could shoulder a significant part of the burden if this gap is closed just by increasing contribution rates.

In the United States, unfunded DB benefit entitlements amount to 0.1 years' worth of harmonized disposable income in 2007 and the value of benefit entitlements in Social Security is equivalent to 1.5 years of income. In France, benefit entitlements in social security are worth 3.2 years of harmonized disposable income. After subtracting liabilities and the social security financing gap, we find that households in France have a comprehensive wealth-to-income ratio of 8.6, compared to 6.5 years' worth of income for US households.

The higher harmonized saving rate and wealth-to-income ratio of France partly reflects the fact that French people need to save more because they retire at younger ages and have slightly longer life expectancies. (In 2010, the average retirement age in France was 61.5 compared with an average age for claiming Social Security benefits in the United States of 63.6.) The saving rate of US households may also be lower because US households rely more on holding gains as a means of building wealth (documented in Durant and Reinsdorf [2008], though, of course, in the years after the financial crisis that strategy did not work so well). Accessibility of credit may also play a

17. In 2012 the new administration announced a partial reversal of these reforms to allow certain employees with careers of more than forty years to retire at age sixty. We have not taken these reform reversals into account. See appendix B, figure 6.B2 for estimates of the future net cash flows of social security in France as percentages of GDP.

role in the lower saving rate of the United States: easy access to credit for US households can substitute for precautionary balances and reduce the precautionary motive for saving.

In addition, the need for saving is greater when risks are higher, and French households probably perceive their retirement wealth as riskier than American households do. Participants in the DB pension plans of the United States generally have property rights to the benefits that they have accrued, and in the private sector benefits are insured by the PBGC. Furthermore, almost thirty years have passed since the only time that Social Security was reformed in the United States, and in that reform the benefit cuts only affected those who were more than twenty years away from the normal retirement age. In contrast, France has had three major retirement reforms since 1993, with more to come, as the funding gap of French social security remains large. In the past reforms, the benefit cuts have included employees nearing retirement and encompassed both pension plans and social security.

In France, in the years after World War II, the generations who reached retirement age had lost most of their savings in war. A delay in the start of benefit payments while the social security system built up the reserves required to operate as a funded plan was therefore impossible. Rather than building up a trust fund, the contributions of the active participants had to be used to fund current benefit payments. The system continued on in this way, based on a kind of intergenerational lending where people hope to obtain from the younger what they gave to the older. Yet the "rate of return" of such a pay-as-you-go system depends on the ratio of contributors to beneficiaries adjusted for increases in labor productivity. When the demographic return from population growth decreases, as nowadays with the so-called "pappy boom," the implicit rate of return of social security must fall, necessitating reforms. It is thus rational for French households to save more because their main asset, consisting of social security benefit entitlements, is risky. To be sure, reforms will also be needed to keep the US Social Security solvent over the long run, but the relative size of the social security financing gap is smaller in the case of the United States, and the importance of social security wealth in households' comprehensive net worth is also smaller.[18]

18. Romig (2008) projected that if no reforms of US Social Security are enacted, currently scheduled benefits will automatically be cut by 22 percent in 2041, rising to a cut of 25 percent in 2082. She was unsure whether monthly benefits will be reduced or whether payments will be delayed until enough funds are available to pay the full amount of a scheduled monthly benefit, resulting in fewer payments per year. Recently, the projections have worsened. According to the 2012 Social Security Trustee's Report, funds will only be available to pay 75 percent of scheduled benefits beginning in 2033.

6.7 Conclusion

A full picture of the operations of pension and social security plans has become a critical part of understanding the economic situation of most countries because populations are aging and DB pension plans have rising numbers of retired participants. For employer-sponsored pension plans, national accounts will be able to provide this full picture by changing from an approach based on cash accounting to the approach based on actuarial estimates of accrued benefit entitlements that is recommended in the 2008 SNA. For Social Security and similar government-sponsored pension plans, the new actuarial measures will not provide complete information for purposes of gauging sustainability, but they will permit international comparisons of countries that have different systems for providing retirement income.

Employer-sponsored DB pension plans play a major role in the US retirement income system. This chapter shows how the new actuarial approach provides the information needed to understand the economics of the operations of these plans. For private DB plans, we find that the actuarial approach provides a more meaningful measure of pension-related compensation by avoiding the excessive volatility that the cash approach suffers when employers alternate between taking a contribution holiday and making large catch-up contributions to fill funding gaps. For plans for employees of state and local governments in the United States (whose funding gaps have recently become a topic of debate—see Novy-Marx and Rauh [2009], [2010], [2011]; Rauh [2010]), we find that the value of claims-to-benefits accrued through service to the employer exceeds cash contributions by more than $100 billion in every year starting in 2004, so the cash approach substantially underestimates saving by households and overestimates saving by state and local governments. For federal government plans in recent years, large amounts of interest accruing on unfunded benefit entitlements of retired participants are included in actual employer contributions, so they are mischaracterized by the cash approach as compensation income for employed participants. Furthermore, additional amounts of interest on unfunded benefit entitlements that are not covered by actual contributions are ignored by the cash approach. Because the cash approach understates compensation income of participants in state and local government plans and understates interest income of participants in federal plans, using the actuarial approach raises the overall estimate of the household saving rate from 2.9 percent to 4.6 percent in 2002–2007, an increase of 1.7 percentage points.

This chapter also demonstrates the usefulness of the actuarial measures of social security and government-sponsored pension plans that are included in a supplementary table in the 2008 SNA for international comparisons of saving rates and wealth of countries with different kinds of retirement systems. The large gap between the high saving rate of households in France

and the low saving rate of households in the United States implied by the cash treatment of pensions and social security in the national accounts of the two countries narrows when actuarial measures are used. However, if only employer-sponsored pension plans were included in the actuarial measures, the gap between the French and US saving rates would be substantially understated, because in France government-sponsored pensions, which are included with social security in the supplemental table called for in the 2008 SNA, substitute for the employer-sponsored pension plans of the United States.

Finally, this chapter suggests three modifications to the actuarial measures introduced in the 2008 SNA to depict the operations of DB pension plans more accurately or to communicate additional details about the operations of pension and social security plans. First, we argue that in institutional settings where employers are responsible for ensuring the solvency of the DB plans that they sponsor, underfunded pension plans should be recorded as receiving imputed interest on their claim on the employer. When employers delay making actuarially required contributions the pension plan is deprived of opportunities to earn property income, so this imputed interest reflects amounts that must be paid to the plan if it is to have sufficient funds to pay the benefits that it owes to the plan participants. Second, when a DB pension plan uses holding gains to help fund benefit expenses, the property income component of its return on investments is likely to be smaller than the interest accruing on the funded portion of its actuarial liability. In the framework of the 2008 SNA, this gap is recorded as negative saving by the DB plan because the plan pays more property income to households than it receives. In the institutional setting of the United States, we prefer to show the saving of the DB pension plan as zero, and to identify the implied funding of pension benefits from holding gains on pension plan assets as implied holding gains received by households.

Third, the supplementary table on social security called for in the 2008 SNA is intended to be comparable with the measures provided in the core accounts for employer-sponsored DB plans, so the actuarial measures of social security exclude future participants. This limits their relevance for questions about sustainability, because for social security sustainability analysis requires "open group" measures that take into account the projected contributions of future participants. We resolve the conflict between comparability with measures of employer-sponsored pension plans and providing information on sustainability by including in our balance sheet measures an allowance for the social security funding gap. This funding gap is deducted in the calculation of households' social security wealth. Besides permitting a more accurate valuation of risky claims to future payments of social security benefits, this allowance enables the accounts to include a kind of sustainability indicator for social security assuming that the plan parameters remain unchanged.

Appendix A

Treatment of Pensions and Social Security in the 2008 SNA Compared with Current Treatment: The Case of France

Table 6A.1 **SNA 2008 treatment of employer-sponsored pensions compared with current treatment in the national accounts of France, 2007 (billions of euros)**

		SNA 2008						Current accounting					
		Pension scheme	Households	Employer	Pension scheme	Households	Employer	Pension scheme	Household	Employer	Pension scheme	Household	Employer
		Uses			Resources			Uses			Resources		
P1	Output				0.5								
D121	Employer actual social contributions			10.3		10.3							
D122	Employer-imputed social contributions												
D44	Investment income	4.2				4.2		4.2				4.2	
D611	Employer actual social contributions		10.3		10.3								
D612	Employer-imputed social contributions												
D613	Households actual social contributions												
D614	Households pension contribution supplement		3.8		3.8								
D62	Social benefit	4.3				4.3							
P3	Consumption		0.5						0.5				
D8	Adjust. for change in household reserves in pension funds	9.8				9.8							
B8	Saving				–3.8	14.1	–10.3				–3.8	3.8	

		Assets		Liabilities			Assets		Liabilities		
					Beginning of the year balance sheet						
F2	Deposits										
F611	Life insurance technical reserves					85.9			85.9		
F612	Household reserves in pension funds		85.9	85.9							
F79	Other accounts payable/receivable										
B90	Net worth			–85.9	85.9				–85.9	85.9	
					Financial account						
F2	Deposits	6.5	3.8			10.3	6.5	3.8			10.3
F611	Life insurance technical reserves							9.8	9.8		
F612	Household reserves in pension funds		9.8	9.8							
F79	Other accounts payable/receivable								0.6	9.8	–10.3
B9	Net lending/borrowing			–3.3	13.6	–10.3			–3.9	3.8	
					Revaluation account						
F2	Deposits										
F611	Life insurance technical reserves										
F612	Household reserves in pension funds		–1.2	–1.2				–1.2	–1.2		
F79	Other accounts payable/receivable										
B10.3	Change in net worth due to revaluation			1.2	–1.2				1.2	–1.2	
					End-of-the-year balance sheet						
F2	Deposits	6.5	3.8			10.3	6.5	3.8			10.3
F611	Life insurance technical reserves							95.7	95.7		
F612	Household reserves in pension funds		94.5	94.5				–1.2	–1.2		
F79	Other accounts payable/receivable								0.6	9.8	–10.3
B90	Net worth			–88.0	98.3	–10.3			–88.6	88.5	

Table 6A.2 **Social security treated as a pension plan in the supplementary table of the 2008 SNA, France, in 2007 (billions of euros; estimated by the authors from PROST)**

	Supplementary table SNA 2008						Core accounts SNA 2008					
	Pension scheme	Households	Employer	Pension scheme	Households	Employer	Pension scheme	Households	Employer	Pension scheme	Households	Employer
	Uses			Resources			Uses			Resources		
Output												
Employer actual social contributions			126		126				126		126	
Employer-imputed social contributions			31		31							
Investment income	287				287							
Employer actual social contributions		126		126				126		126		
Employer imputed social contributions		31		31								
Households' actual social contributions		72		72				72		72		
Households' pension contribution supplement		287		287								
Social benefit	231				231		231				231	
Consumption												
Adjust. for change in household reserves in pension funds	285				285							
Saving				–287	444	–157				–33	159	–126

	Assets	Liabilities			Assets	Liabilities		
			Beginning of the year balance sheet					
Deposits								
Life insurance technical reserves								
Household reserves in pension funds	7,035	7,035						
Other accounts payable/receivable								
Net worth		–7,035	7,035					
			Financial account					
Deposits	231	105		126	231	105		126
Life insurance technical reserves								
Household reserves in pension funds	285	285						
Other accounts payable/receivable								
Net lending/borrowing		–389	516	–126		–105	231	–126
			Revaluation account					
Deposits								
Life insurance technical reserves								
Household reserves in pension funds	74	74						
Other accounts payable/receivable								
Change in net worth due to revaluation		–74	74					
			End-of-the-year balance sheet					
Deposits	231	105		126	231	105		126
Life insurance technical reserves								
Household reserves in pension funds	7,394	7,394						
Other accounts payable/receivable								
Net worth		–7,498	7,625	–126		–105	231	–126

Appendix B

Using PROST to Estimate Accrued-to-Date Pension Entitlements on Social Security

PROST is a generational model developed by the World Bank (Holzmann, Palacios, and Zviniene 2001). We use it to calculate accrued-to-date benefit entitlements for social security, which are not available from official data sources for France. In order to assess the quality of the estimates, the financing gap produced by PROST have been compared to official estimates (OASDI report in the United States, and the "Conseil d'Orientation des retraites" 2010 report in France). For the sake of comparison between the two countries, the nominal discount rate has been fixed to 4 percent, which with effective inflation, makes a variable real discount rate.

PROST calculates the accrued-to-date entitlements with the projected benefit obligation method that is taking into account the future increase in salary until retirement date. The exact formula adds accrued-to-date entitlements of present retirees in equation (1) to accrued-to-date entitlements of future ones in equation (2).

(1) = $\sum_{t=1}^{T}$(*number of new retirees by age, gender, salary cluster*) × (*present value of futute pension paid by age, gender, salary c luster conditional to being in life*)

(2) = (1) for current contributors by age, gender, salary cluster × number of years already worked/total career

Data needed are the following:

- population, number of contributors and beneficiaries by gender and age;
- salaries and pensions (amount) by age and decile of revenue;
- contribution rate, under ceiling and without ceiling, with indexation rule for ceiling;
- legal retirement age, with possible discount for early retirement;
- maximum replacement rate and number of years needed to attain it;
- indexation on pension on inflation or wage growth;
- invalidity and widows' pensions; and
- GDP growth, real wage growth, inflation rate, discount rate.

For France, the model was applied to all contributors and retirees, except the state civil servants. The model was originated in 1993, in order to capture the evolution entailed by the reforms of required length of career and number of years used to calculate the reference salary depending on the age of the retiree. The data were benchmarked on the "Conseil d'orientation des

retraites" (COR), a board of experts and social partners that was created in 2000 in order to provide analysis on the evolution of the pension system. These analyses are the basis for the discussions organized at the "meeting points," where decisions and laws are to be taken to restore the long-term balance of the pension system.

Data sources were the following:

- Population: INSEE projection;
- Contributors = active population less state civil servants × activity rate by age from the INSEE;
- Unemployment rate by age from INSEE and decrease of 2 percent from 2015 onward for people under age fifty and from 1 percent onward for people over age fifty, due to the increase in retirement age;
- Combined contributions to CNAVTS and AGIRC-ARRCO with a distinction between contribution under social security ceiling (2.3 percent from 2006 onward) and contribution above ceiling (21.7 percent);
- Legal retirement age: sixty and sixty-two after 2010 after reform;
- Maximum replacement rate of 95 percent attainable in 37.5 years in 1993 up to 41.75 years in 2020. This lead to an incremental replacement rate of 2.53 in 1993 going down to 2.28 in 2020;
- Number of years used to calculate the reference salary form 10 in 1993 to 25 in 2008 onward;
- Inflation, GDP growth, labor productivity growth are updated up to 2009. Afterward, inflation rate is set at 2 percent and other variables are aligned on COR C scenario.

Table 6B.1 Macroeconomic parameters used by the COR and in PRST estimates

	2009–2013	2014–2020	2021–2050
	Scenario B		
Unemployment rate	8.4	7.7	4.5
GDP real growth	1.3	2.2	1.6
Labor productivity growth	1.4	1.8	1.6
	Scenario C		
Unemployment rate	8.4	7.7	7
GDP real growth	1.3	2	1.6
Labor productivity growth	1.4	1.8	1.6

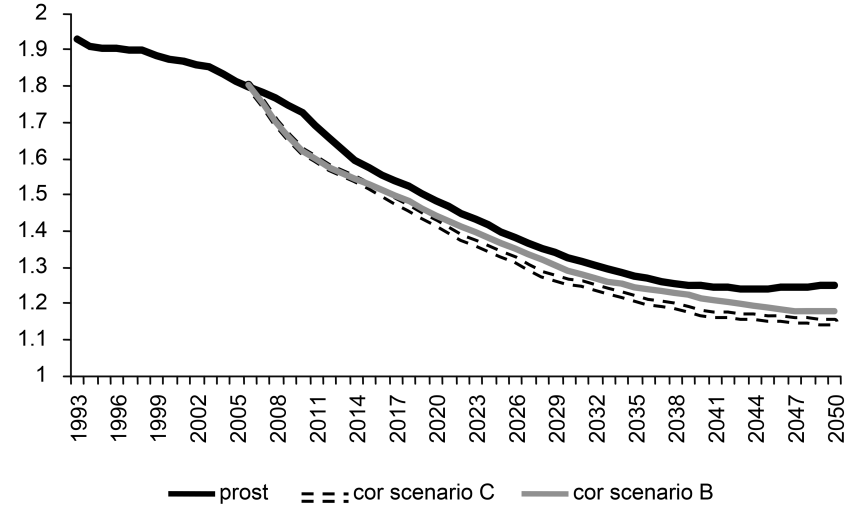

Fig. 6B.1 Ratio of contributors to retirees in France (based on PROST using benchmarks from the COR)

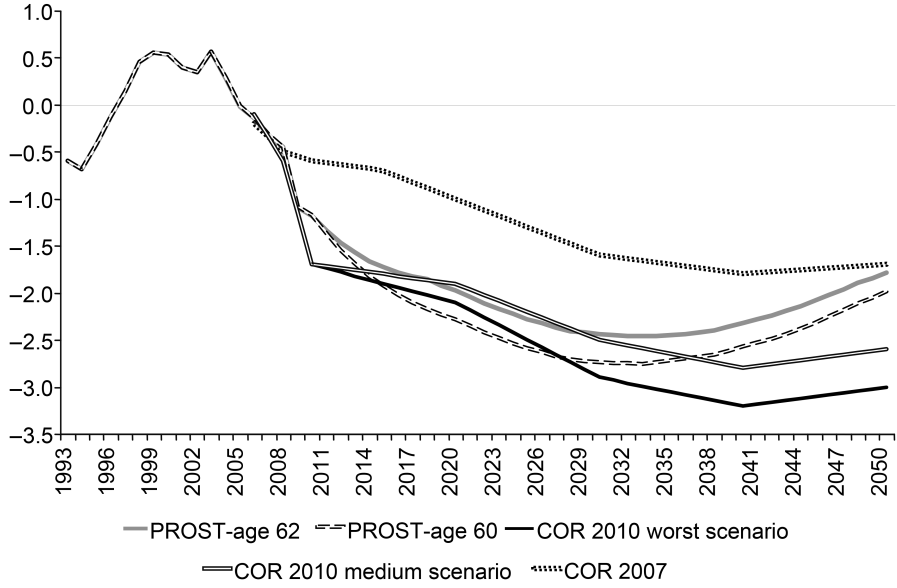

Fig. 6B.2 Projected net cash flow for social security in France, as a percent of GDP (based on the authors' simulations using PROST and the COR)

Notes: For the United States, the model was applied to the entire population. The model was started in 2003. Data sources were the following: the Census bureau regarding population, the Bureau of Labor regarding wages, and the OASDI trustee report regarding Social Security. The contribution rate was fixed to 6.2 percent under ceiling and 6.2 percent above ceiling. The maximum replacement rate was fixed to 64 percent after forty-five years of contribution, which lead to an incremental replacement rate of 1.43 percent a year. The minimum retirement age is 65 in 2002, 66 in 2006, and 67 in 2027.

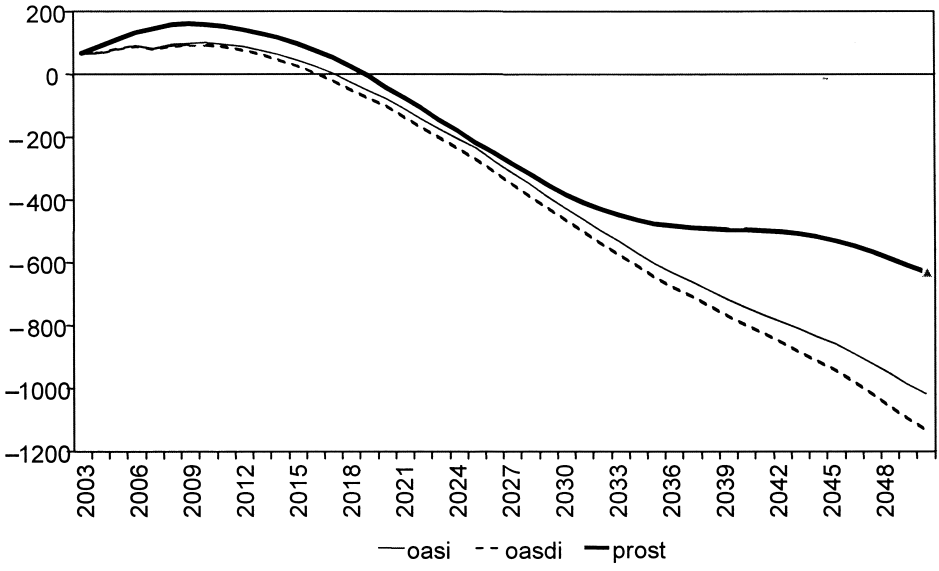

Fig. 6B.3 Projected net cash flow for Social Security in the United States (billions of dollars)

Appendix C

Harmonized Saving Rates and Wealth-to-Income Ratios for the United States and France

Table 6C.1 United States (billions of dollars, unless otherwise marked)

	2003	2004	2005	2006	2007	2008
GDP (billions of dollars)	11,417	12,145	12,916	13,612	14,291	14,191
Adjusted disposable income	**9,097**	**9,638**	**10,072**	**10,756**	**11,313**	**11,966**
Current measure of saving, as percent of adjusted disposable income	3.2	3.3	1.4	2.4	2.2	4.9
Correction for actuarial treatment of pension plans						
Actual employer contributions	225	226	236	242	241	301
Imputed employer contributions	39	49	56	61	81	38
Actual property income	174	182	188	203	210	205
Imputed property income[a]	211	208	237	242	263.3	278
Benefits	354	372	384	413	440	461
Corrected disposable income	**9,347**	**9,895**	**10,365**	**11,058**	**11,657**	**12,281**
Corrected saving rate	5.8	5.8	4.2	5.1	5.1	7.4
Social security						
Actual employer contributions	254	267	281	296	310	327
Imputed employer contributions	–175	–164	–131	–65	–148	–146
Actual employee contribution	292	308	325	343	360	377
Imputed property income at 4% interest rate	1,429	1,494	1,565	1,645	1,731	1,819
Benefits	479	488	495	505	521	541
Harmonized disposable income	**10,668**	**11,313**	**11,910**	**12,772**	**13,390**	**14,116**
Harmonized saving rate	17.4	17.6	16.6	17.8	17.4	19.4
Household sector balance sheet, in years of harmonized disposable income						
Current recording						
Nonfinancial assets	1.9	2.0	2.2	2.1	1.9	1.6
Of which, real estate	1.5	1.7	1.8	1.8	1.6	1.2
Financial assets	3.5	3.6	3.8	4.0	4.0	3.1
Of which, life insurance	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
Pension funds	*0.9*	*0.9*	*1.0*	*1.0*	*1.0*	*0.7*
Total assets	**5.3**	**5.6**	**6.0**	**6.1**	**5.9**	**4.7**
Liabilities	**0.9**	**0.9**	**1.0**	**1.0**	**1.0**	**1.0**
Harmonized recording						
Correction to DB pension plans	0.18	0.13	0.14	0.14	0.12	0.12
Benefit entitlements from social security	1.71	1.69	1.68	1.65	1.66	1.65
Less: Financing gap	–0.10	–0.10	–0.10	–0.10	–0.10	–0.10
Railroad retirement and PBGC	0.01	0.01	0.01	0.01	0.01	0.01
Total corrected assets	**7.2**	**7.4**	**7.7**	**7.8**	**7.5**	**6.3**

[a]SNA 2008 measure of imputed property income includes amounts treated as implied holding gains in tables 6.4 and 6.5.

Table 6C.2 France (billions of euros, unless otherwise marked)

As % of corrected disposable income (unless otherwise indicated)	2003	2004	2005	2006	2007	2008
GDP	1,588	1,656	1,718	1,798	1,887	1,933
Adjusted disposable income	**1,267**	**1,320**	**1,363**	**1,422**	**1,491**	**1,539**
Current saving rate as % of adj. DI	9.6	9.9	9.0	9.1	9.6	9.5
Pension entitlements						
Actual contributions	7	7	8	9	10	11
Actuarial contributions	0	0	0	0	0	0
Actual property income	3	3	3	3	4	4
Imputed property income up to 4% rate	0	0	0	0	0	0
Benefits	3	3	4	4	4	6
Corrected disposable income	**1,274**	**1,327**	**1,371**	**1,431**	**1,501**	**1,550**
Corrected saving rate	10.1	10.4	9.5	9.7	10.2	10.0
Social security (incl. civil servant)						
Employer actual contributions	104	110	116	122	126	124
Employer actuarial contributions	39	36	30	26	31	45
Employee actual contributions	60	63	67	70	72	68
Property income at 4.0% rate	244	254	268	279	287	301
Benefits	188	197	207	219	231	243
Harmonized disposable income	**1,533**	**1,592**	**1,645**	**1,710**	**1,786**	**1,845**
Corrected saving rate	25.3	25.3	24.6	24.4	24.5	24.4
Balance sheet, in year of corrected disposable income						
Current recording						
Nonfinancial assets	2.8	3.2	3.6	3.8	3.9	3.8
Of which, real estate	2.5	2.8	3.2	3.4	3.5	3.4
Financial assets	1.7	1.8	1.9	2.0	2.0	1.9
Of which, pension entitlements in insurance corp.	0.0	0.0	0.0	0.1	0.1	0.1
Of which, other life insurance	0.5	0.5	0.6	0.6	0.6	0.6
Total asset	**4.6**	**5.0**	**5.5**	**5.8**	**6.0**	**5.6**
Liabilities	**0.5**	**0.5**	**0.6**	**0.6**	**0.7**	**0.7**
Harmonized recording						
Pension entitlements on social security	4.1	4.1	4.1	4.1	4.1	4.2
Less cumulated financing gap	–0.9	–0.9	–0.9	–0.9	–0.9	–0.9
Total corrected assets	**7.7**	**8.1**	**8.7**	**9.0**	**9.2**	**8.8**

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