The Real Deal Research

2018 Retirement Income Adequacy at U.S. Plan Sponsors

October 2018

Empower Results®

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Overview

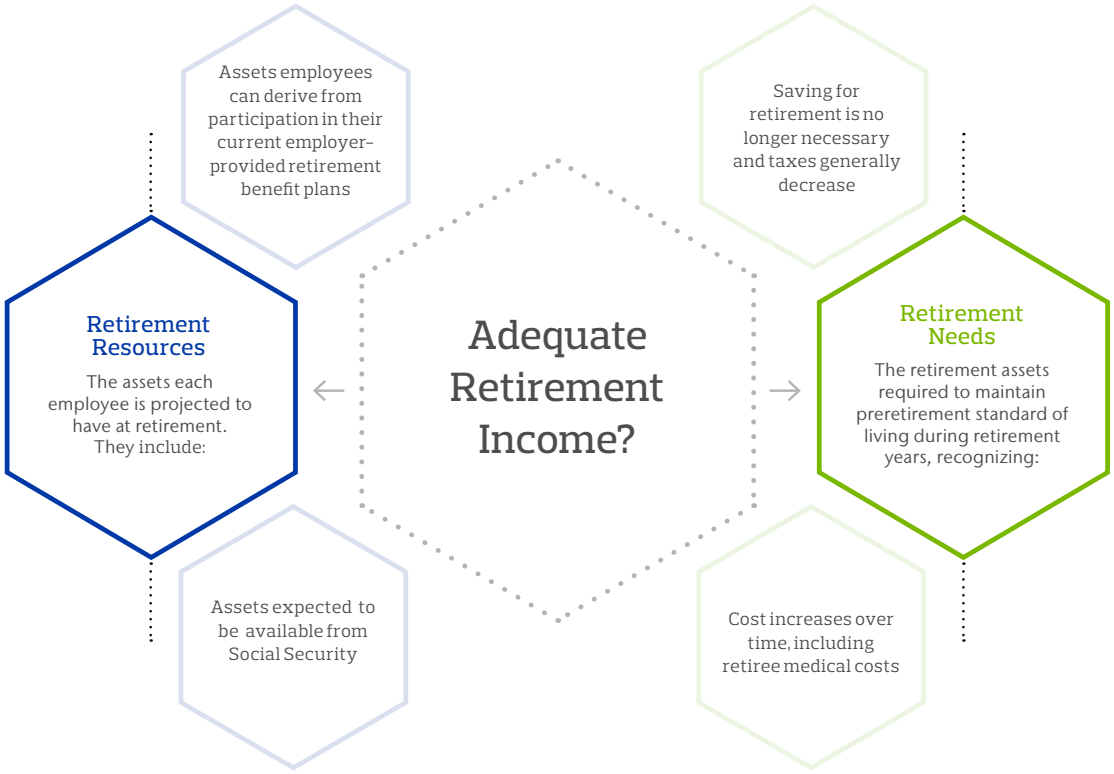
Overview

This paper is a companion document to Aon's *The Real Deal: 2018 Retirement Income Adequacy at U.S. Plan Sponsors* series. In this paper we discuss:

- The baseline results and methods for determining financial retirement adequacy:
  - Needs, including our definition and the elements used in the calculation of needs.
  - Resources, including defined contribution, defined benefit, and Social Security resources.
  - The resulting surplus or shortfall.
- The assumptions used in our calculations.
- The data used to reflect both employee behavior and employer benefits provided.
- The use of multiples of pay as an expression of retirement adequacy, in comparison to replacement ratios.

Overview (cont'd.)

The Real Deal looks at the retirement resources and needs projected for a wide, representative array of employees at U.S. plan sponsors.

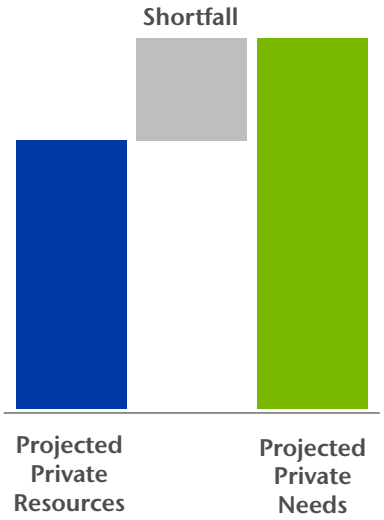


Retirement needs and resources are calculated individually for each representative person in the study.

Overview (cont'd.)

In *The Real Deal* results, a positive difference between retirement resources and needs indicates a surplus of resources, and a negative difference indicates a shortfall of resources.

This study expresses an employee's retirement needs and resources as a multiple of their projected pay at retirement to avoid differences due to current age or variation in compensation (and thus standard of living). In many cases, average needs, resources, and overall surplus/shortfall are shown for a specific reported group.



Resources > Needs

Employees whose retirement resources are projected to meet or exceed their retirement needs ("surplus resources") are likely to have adequate income during retirement.

Resources < Needs

Those whose retirement resources are projected to fall short of their needs ("shortfall of resources") are more likely to have inadequate retirement income.

Retirement Needs

Retirement Needs

Needs are depicted with green colors throughout *The Real Deal.*

Retirement Needs
The sum of money an employee needs at retirement to last through all their retirement years

Age 67 Retirement	**Multiple of Pay**
Total needs	16.4x
Social Security resources	5.3x
Private needs	**11.1x**

Traditional studies, such as the 1981 Report of the President's Commission on Pension Policy and the 1988–2008 editions of the Aon/Georgia State *Replacement Ratio Study*™, are based on the idea that individuals need an income that will allow them to maintain their preretirement standard of living over a postretirement lifetime. *The Real Deal* also relies on this premise and defines retirement needs as the amount that would allow the employee the same amount of spendable income before and after retirement. The study takes into consideration changes that occur at retirement—primarily changes in the level of taxes, the fact retirees no longer need to save for retirement, and changes in medical costs. Additionally, as considered in an alternative scenario, retirees may personally choose to reduce their standard of living in retirement.

Private needs are the needs that remain after accounting for what can be covered by Social Security benefits. These are the needs that must be covered by employer benefits or employee savings.

The average projected needs for full-career contributors are 16.4 times pay at retirement, or 11.1 times pay after adjusting for the expected value of Social Security at age 67.

The baseline scenario of the study determines retirement needs as follows:

Determine the amount of income a person needs in the first year of retirement to maintain their standard of living.

Calculating the annual income that would allow an employee to maintain preretirement living standards in the year after retirement begins with projecting each employee's current pay to retirement age using an assumed pay growth rate, and then adjusting to reflect that:

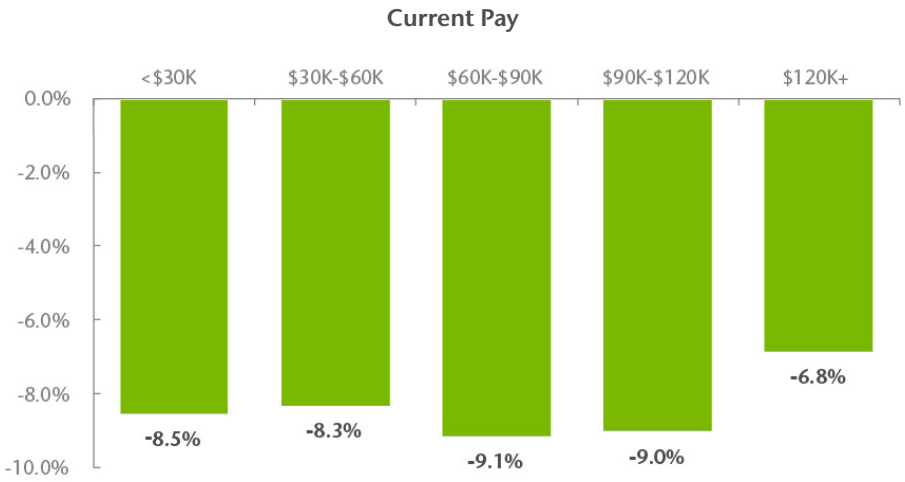
- **Saving for retirement ceases**
  Prior to retirement, employees save a portion of their income for retirement instead of spending it. Therefore, this amount does not need to be replaced after retirement, and projected pay is reduced by an amount based on the employee's defined contribution plan savings rate at retirement. The savings rate is the employee's current savings rate adjusted for anticipated increases for any automatic contribution escalation elections, assuming the employee does not opt out before their target contribution rate is reached.
- **Taxes tend to decrease in retirement**
  Taxes payable after retirement generally decrease from preretirement levels, so each employee's projected pay is reduced for the difference. Taxes are reduced primarily because a portion of Social Security benefits is not subject to taxation and retirees are no longer paying FICA taxes on wages. Additionally, gross income may be lower after retirement, and a lower tax bracket may be applicable.

Retirement Needs (cont'd.)

Taxation adjustments in retirement vary by individual. The largest decrease in tax rate is observed in the middle-income group. Participants at higher income levels will have more of their Social Security benefit taxed, so they will generally experience a proportionally smaller decrease in taxes than lower-income participants. Conversely, the lowest-income individuals are already in the lowest tax brackets, so the reduction in taxes postretirement is limited.

Reduction in Retirement Needs Due to Taxes by Current Pay (Figure 1)

Baseline
Full-Career Contributing Employees at Retirement Age 67



- **Health care expenses generally increase at retirement**
  As individuals retire and move from active employee health care to retiree health care, they can see dramatic increases in health care premiums and out-of-pocket costs—with the typical active employee paying 25 to 30 percent of their health care costs and the typical future retiree paying nearly all of their costs. Moreover, the rate of health care inflation is markedly higher than general price inflation.

To assess the impact of retiree medical costs, the study considers a plan that gives employees access only, based on retiree rates, with no subsidy. As more employers reduce or eliminate retiree medical subsidies, it is increasingly appropriate for employees—even those currently expecting a retiree medical subsidy—to plan for this access-only scenario.

The study projects the dollar cost of retiree medical insurance, focusing on the incremental increase in moving from active employee to retiree. This incremental cost has been added to the retirement income needs.

Retirement Needs (cont'd.)

Health care costs (relative to pay) vary across generations because medical inflation is higher than both regular inflation and salary increases. As a result, retiree medical costs are likely more affordable today than they are expected to be in the future. Medical inflation and capped or declining employer subsidies for retiree health benefits are eroding retirement resources.

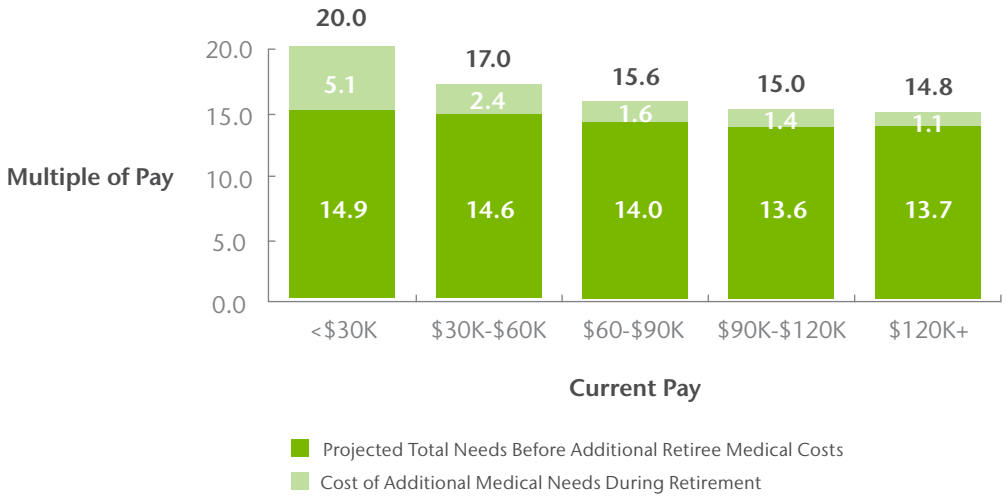
Health care costs also vary somewhat by income level due to government subsidies. While Medicare premiums are lower at lower income levels and Affordable Care Act subsidies provide some assistance to low-income participants, these participants still have much higher medical needs as a percentage of their income.

On average, an employee needs about 4.4 times pay at retirement to pay for unsubsidized retiree medical coverage at group purchasing rates—about 25 percent of total needs. Of this amount, the study attributes about 2.2 times pay to additional costs over what the employee was accustomed to paying as an active employee.

The availability of Medicare—including Medicare prescription drug coverage—starting at age 65 represents a substantial "asset" available toward meeting postretirement medical needs. For those employees who choose to retire before Medicare is available, the cost of health coverage is significant.

Total Retirement Needs by Current Pay (Figure 2)

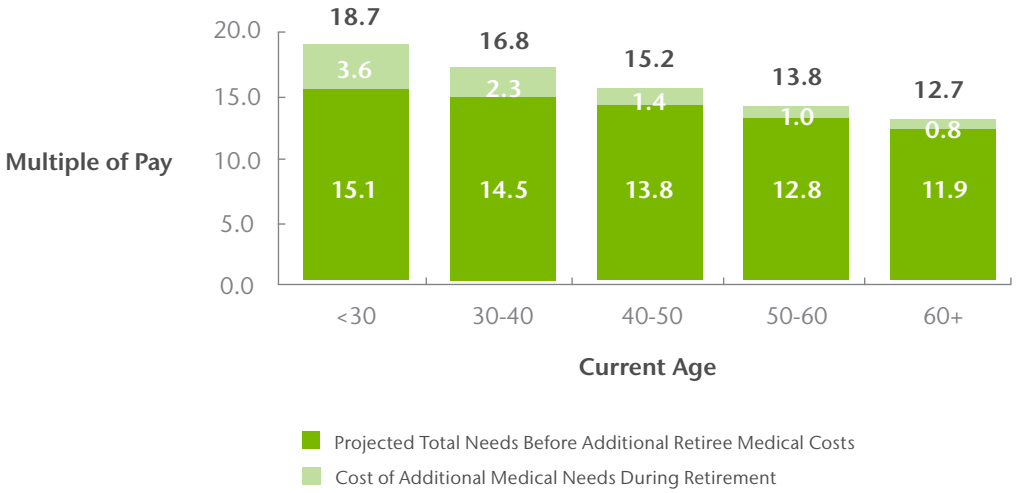
Baseline
Full-Career Contributing Employees at Retirement Age 67



Retirement Needs (cont'd.)

Total Retirement Needs by Current Age (Figure 3)

Baseline
Full-Career Contributing Employees at Retirement Age 67



Generally, the income needed in the first year of retirement is less than the preretirement income. The need determined by adjusting pay at retirement for savings, taxes, and changes in medical costs is often expressed in terms of a replacement ratio. This ratio is the need in the first year of retirement divided by pay in the year before retirement.

In the first year of retirement, an average full-career contributor needs to replace 90 percent of pay to maintain their preretirement standard of living. While traditional retirement adequacy analysis ends here, *The Real Deal* continues.

Step 2

Project how the retiree's expenses will change each year following retirement.

The amount needed to maintain the same standard of living increases each year as the cost of goods and services increases with inflation. Active employees normally receive salary increases to mitigate the effect of inflation on their standard of living. However, retirees must manage inflation on their own.

The cost of medical care is expected to increase at a faster rate than regular inflation; therefore, the amount of assets needed to cover the additional cost of medical increases above inflation is also calculated.

- Health care costs are expected to increase with an assumed medical trend rate of 5.5 percent per year, and other costs are expected to increase with an assumed inflation rate of 2.25 percent per year.

Retirement Needs (cont'd.)

Step 3

Calculate total needs, the single-sum amount a person needs at retirement to maintain their preretirement standard of living throughout retirement.

After projecting the income level deemed to provide adequate retirement income in the first year of retirement, the single sum required to provide for that level of income over the employee's postretirement lifetime is determined. The single-sum value is the amount of assets a retiree would need to have invested to provide for annual payments equal to the adequate income level—reflecting annual increases due to inflation—during the employee's expected postretirement lifetime.

The study projects assets will grow during retirement at a rate of 5 percent per year.

In *The Real Deal*, single sums such as this are expressed as a multiple of projected pay at retirement.

Step 4

Calculate the equivalent single-sum amount expected to be provided by Social Security.

The study projects an individual's Social Security primary insurance amount payable at retirement. This amount represents the assets which, when combined with postretirement investment returns, provide for a lifetime of expected Social Security payments (including anticipated future cost-of-living increases).

Step 5

Calculate private needs by adjusting total needs for Social Security.

Since it can be difficult to understand the income Social Security will provide, it may be easier for employees to compare their resources from defined contribution and defined benefit plans against their private needs (total needs adjusted downward by the amount Social Security will provide).

Example : Male, Age 40, Current Salary of $60,000, Current Savings Rate of 6%

	Amount	% of Pay			Multiple of Pay
Pay at age 67 retirement	$162,100	100%			
Decrease for savings rate	$(9,700)	(6%)			
Taxation difference	$(12,300)	(8%)			
Preretirement medical expenditures	$(16,600)	(10%)			
Premedical needs in first year of retirement	**$123,500**	**76%**	→	Calculate the present value with 2.25% inflation and 5% assumed return on resources postretirement until age 88	→ **12.2x**
Postretirement medical expenditures	$22,500	14%	→	Calculate the present value with 5.5% medical inflation and 5% assumed return on resources postretirement until age 88	→ 3.0x
Needs in first year of retirement	**$146,000**	**90%**			**15.2x**
Social Security in first year of retirement	$(54,700)	(34%)	→	Calculate the present value with 2.25% inflation and 5% assumed return on resources postretirement until age 88	→ (5.4x)
Private needs	**$91,300**	**56%**			**9.8x**

Comparison of Needs by Age and Pay

When the study considers private needs only (retirement needs net of Social Security), additional variation in the amount needed is apparent. Social Security replaces more pay for lower-income participants; this helps to offset the fact that lower-income participants need a larger percentage of their income for health care. While 11.1 times pay provides a helpful overall benchmark, Figure 4 shows the resulting variance of private needs by age and income level. Thus it is important for individual employees to use their own age- and income-specific benchmarks to track their progress toward accumulating adequate retirement resources during their working careers.

Private Needs by Current Age and Pay (Figure 4)

Retirement Resources

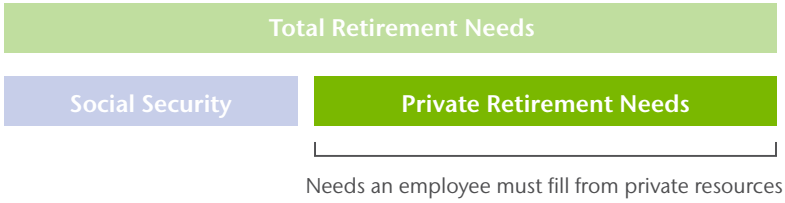
Retirement Resources

Resources are depicted with blue colors throughout *The Real Deal*.

Retirement Resources
The single-sum value of amounts projected to be available to an employee at retirement

The Real Deal recognizes retirement resources from three sources—employer defined contribution plans (both employee and employer money), current employer defined benefit plans, and Social Security. As a subset of this, the study highlights private retirement resources, which include only resources provided by the employee or employer. To determine how much private retirement resources an individual requires, total needs are offset by the resources Social Security provides. This permits a focus on the resources over which employees and employers have control.

Age 67 Retirement	**Multiple of Pay**
Defined benefit	0.8x
Employer-provided defined contribution	2.7x
Employee-provided defined contribution	4.4x
Private resources	**7.9x**
Social Security	5.3x
Total resources	**13.2x**



Like needs, resources in *The Real Deal* are expressed as a multiple of projected pay at retirement ("multiple of pay"). Some retirement resources, such as Social Security and certain defined benefit plan benefits, are payable only as fixed monthly installments over the employee's lifetime. *The Real Deal* expresses these fixed installments as the single-sum amount at retirement that, when invested, would provide an equivalent stream of payments designed to last through the employee's expected age at death.

The average projected level of privately held retirement resources for full-career contributors at age 67 is 7.9 times pay at retirement. In addition, the average expected value of future Social Security benefits is 5.3 times pay.

Retirement Resources (cont'd.)

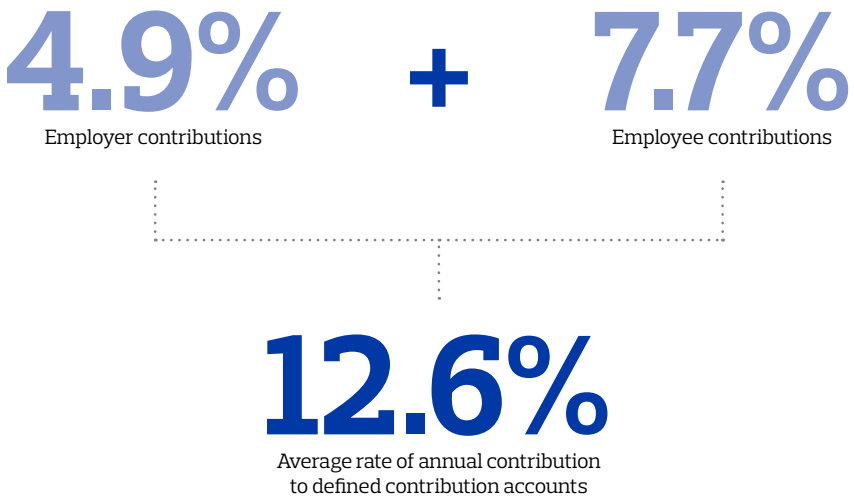
Defined Contribution Resources

The study projects defined contribution balances as of Jan. 1, 2017, with future contributions to retirement age. This is calculated using:

- Employee contribution rate elections, including automatic escalation elections, Roth, and pretax designations.
- Matching and nonelective company contributions based on average plan design by industry.
- Investment earnings at an assumed preretirement rate of return to accumulate the account and future contributions to retirement age.

The baseline scenario assumes future contribution rates will equal current contribution rates, as limited under IRC Section 402(g). If an employee has elected automatic contribution escalation, the contribution rate increases each year until reaching the maximum savings rate target. Pay is limited under IRC Section 401(a)(17).

About 90 percent of private resources come from defined contribution plans. This includes 55 percent from employee savings alone, underscoring the importance of personal savings for retirement. Note that the employer-provided defined contribution amounts reflect imperfect employee participation (i.e., savings rates below the employer's maximum match level), so the potential value of this employer-provided amount is actually higher.

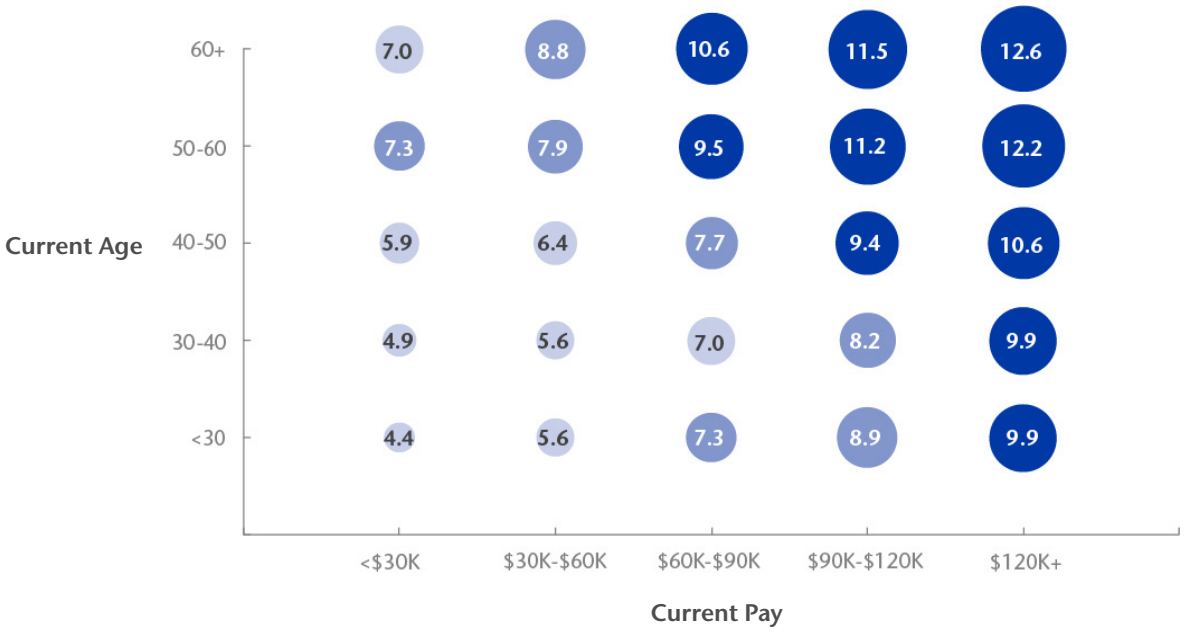


Retirement Resources (cont'd.)

Figure 5 shows the variance in employee savings rates by age and income level.

Employee Savings Rates by Current Age and Pay (Figure 5)

Baseline
Full-Career Contributing Employees at Retirement
Age 67



Defined Benefit Resources

The study estimates pension benefits at retirement age for those covered by a defined benefit plan. This is calculated using:

- Prevalence of defined benefit plans by industry.
- Average projected defined benefit plan benefit by industry.

The value of the average defined benefit resources is calculated:

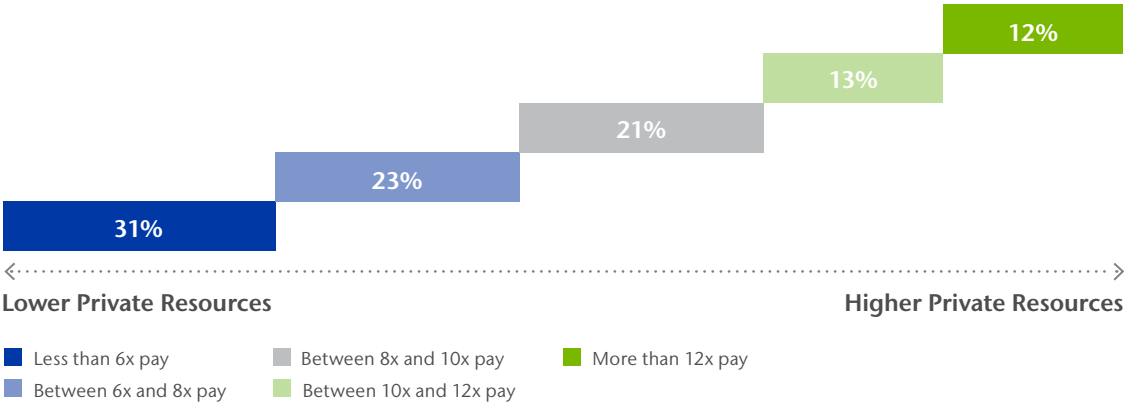
- For cash balance or pension equity plans, as the lump-sum value of the benefit.
- For traditional final average pay or career average pay plans, retirement resources are the single-sum value of the projected benefit; this value represents the amount of assets which, when combined with postretirement investment returns, should provide for a lifetime of periodic payments.

As each full-career contributor has different needs at retirement, each is also projected to have different resources accumulated by age 67. Figure 6 shows the distribution of these resources. The levels of retirement resources are broadly distributed, with the majority clustered around accumulation levels between 6 and 12 times pay at retirement.

Retirement Resources (cont'd.)

Distribution of Private Resources (Figure 6)

Baseline
Full-Career Contributing Employees at Retirement Age 67



The level of the employer-provided benefit varies by industry and also by generation. As employers have generally moved from defined benefit plans to a defined contribution plan approach, the level of employer-provided benefits has decreased. For example, the level of retirement benefits provided by Fortune 500 companies has dropped by about 1 percentage point of pay over the past decade.[1] This trend has put more pressure to save on younger workers.

The table below shows the prevalence of defined benefit plans and the average employer-provided defined contribution benefits, grouped by industries with similar types of plans.

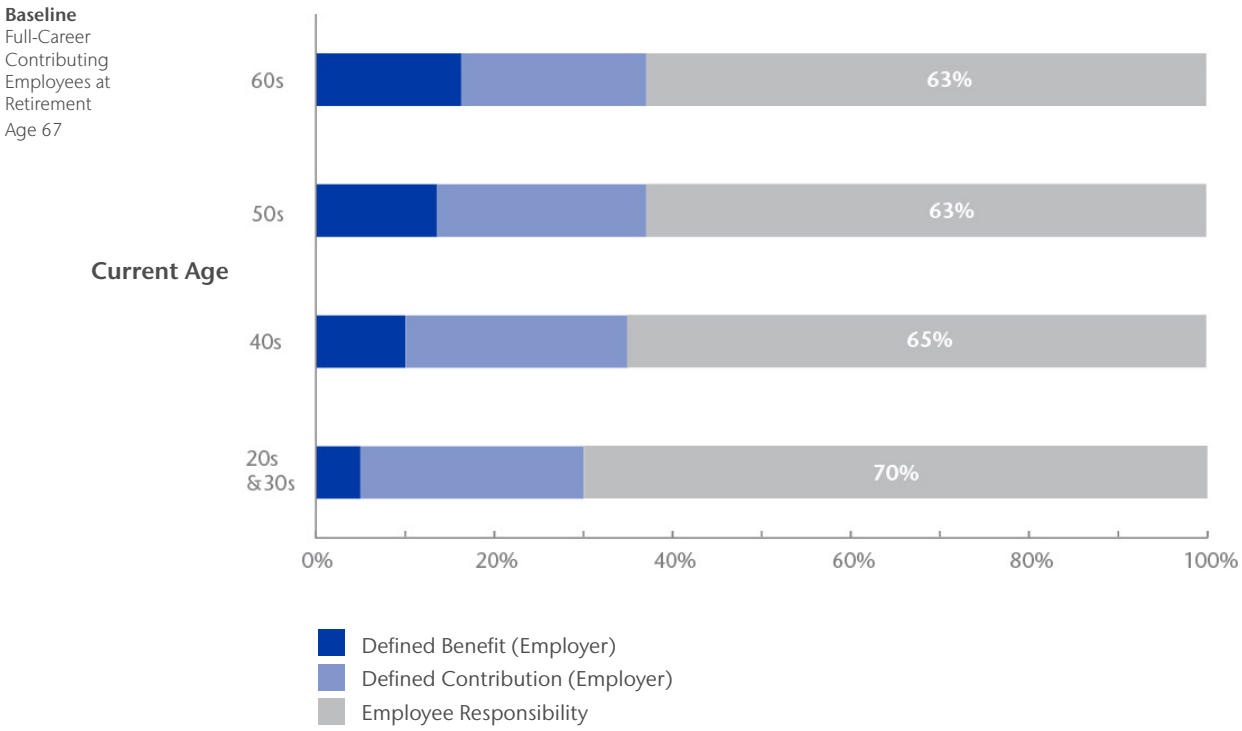
Industry	Prevalence of Open DB Plans	Prevalence of Closed DB Plans	Average Employer DC Contribution
Utilities	54%	33%	5.8%
Agriculture/Insurance	36%	20%	5.7%
Energy, Oil, and Mining	35%	8%	7.4%
Industrial Equipment	25%	25%	6.8%
Accounting/Transportation	25%	21%	5.9%
Health Care Services and Hospitals/Medical Products	21%	12%	3.8%
Aerospace/Chemicals/Food and Beverage	14%	40%	7.6%
Pharmaceuticals/Research and Testing	11%	35%	6.0%
Automotive/Building Materials/Engineering and Construction/Media and Entertainment	11%	20%	5.3%
Electronics/Publishing and Printing/Telecommunications	8%	16%	6.4%
Forest Products and Packaging/Personal and Consumer Products	6%	26%	6.0%
Food Service/Hotels, Resorts, and Casinos/Retail Distribution	4%	9%	2.6%
Banking and Finance	3%	12%	6.5%
Technology	0%	5%	2.8%
Total U.S. Workforce	**12%**	**17%**	**4.9%**

[1] *Source: Aon's Benefit Index® valuations of Fortune 500 companies over time.*

Retirement Resources (cont'd.)

Figure 7 demonstrates the varying levels of employer-provided resources by generation. While those in their 60s see 37 percent of their needed retirement income coming from their employers, those in their 20s and 30s are responsible for more, with only 30 percent coming from employer benefit plans.

Percentage of Retirement Needs Provided from Private Sources (Figure 7)



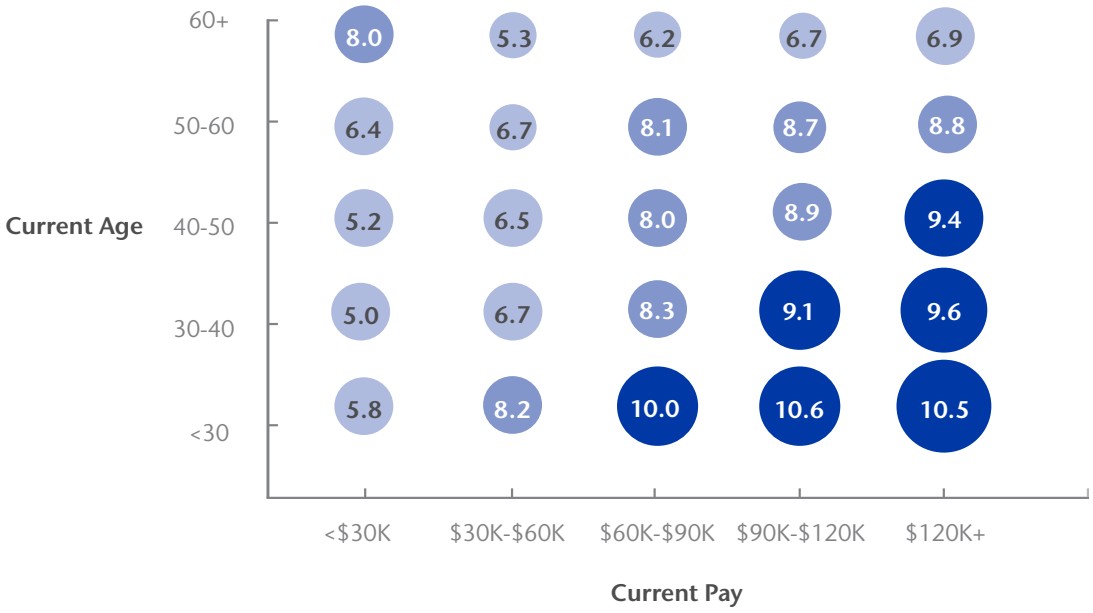
Retirement Resources (cont'd.)

Total private resources by age and income level are shown in Figure 8. Participants at the higher income levels are projected to accumulate more. Younger employees generally are also expected to accumulate more, but as shown in the previous section, their projected retirement needs are higher as well.

Past contributions and investment experience play an increasingly important role in a participant's projected resources as age increases. For the youngest participants in our study, we assume continued regular savings and steady investment gains. Those later in their career may have had some years in which they could not save as much or had poor investment experience. Some also may have taken money out of their retirement savings to use for current necessities. In this study, such actual experience manifests itself in their current defined contribution balances and, consequently, in their projected results.

Projected Private Resources by Current Age and Pay (Figure 8)

Baseline
Full-Career Contributing Employees at Retirement Age 67



Retirement Resources (cont'd.)

Social Security Resources

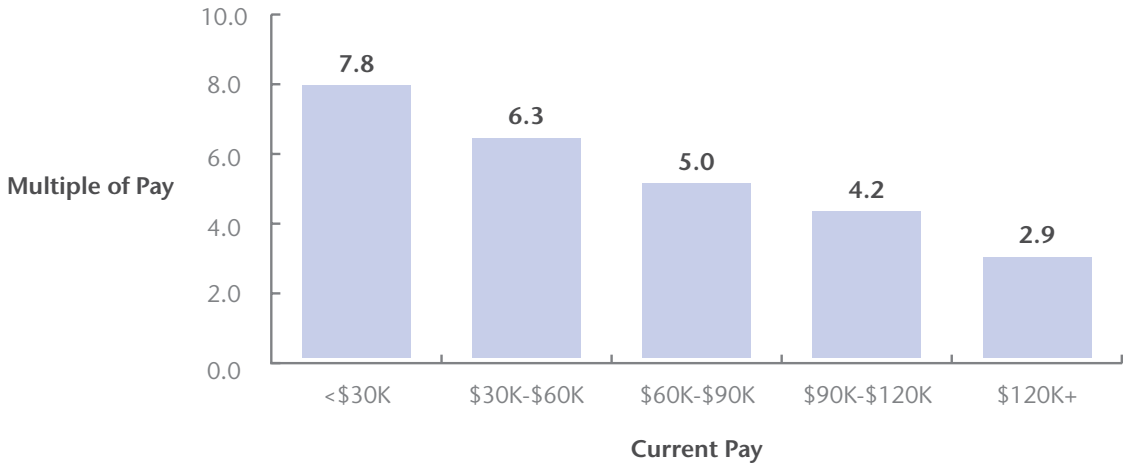
The study projects an individual's Social Security primary insurance amount payable at retirement.

The single-sum value of these benefits equals the amount of assets which, when combined with postretirement investment returns, should provide for a lifetime of the expected Social Security payments (including expected future cost-of-living increases).

Social Security provides another key retirement resource for employees, particularly for those at lower income levels, as shown in Figure 9. Social Security provides from 2.9 times pay to 7.8 times pay across the income levels shown. The amount provided by Social Security ranges from 20 percent to almost 40 percent of total projected needs for employees at various income levels.

Social Security Resources by Current Pay (Figure 9)

Baseline
Full-Career Contributing Employees at Retirement Age 67



Disruptions to Accumulation of Retirement Resources Not Reflected in Study

The process used in this analysis assumes active employees remain employed with their current employer until retirement, and that their employer-sponsored plans remain unchanged. In the baseline scenario, it also assumes Social Security provisions remain unchanged. Furthermore, the process assumes there are no employee-invoked disruptions of asset accumulation through such events as withdrawal activity, unpaid loans, or lapses in contribution levels.

From the employer perspective, it is appropriate to focus on employees who remain until retirement. However, we also recognize mid-career changes in employment are of concern to employees. Although the study does not analyze the disruptive effect of employment changes, it should be noted that employees who change employment and move to another employer (with a comparable benefits package) may have the opportunity to receive comparable benefits after the job change. This is especially true if their initial employer maintains a benefits structure—such as cash balance or defined contribution only—that accrues benefits more evenly throughout an employee's career and is not leveraged by focusing on final pay. The picture will look far different for those who terminate employment and, as a result of that termination, reduce or stop the growth of their retirement wealth.

Resources Not Reflected

Due to data limitations, this study does not include retirement income sources such as former employer retirement plans (unless the value of the prior benefit has been rolled over to the current employer's defined contribution plan), other personal investments, home equity, long-term-care insurance, or spouse's retirement income benefits. If the employee has other financial resources such as these, the projected resources may be greater.

Specifically, there are several retirement resource assumptions that have been made in this study:

- *The Real Deal* does not consider amounts retained in the plans of prior employers (unless rolled over), amounts in individual retirement accounts (IRAs), or other personal assets (including real estate values held in the form of personal and other residences).
- Aon did review IRA data available from the Employee Benefit Research Institute (EBRI) and the 2013 Survey of Consumer Finances. The analysis of the EBRI data determined the median account balance of IRAs for employees with an IRA. The 2013 Survey of Consumer Finances determined the probability an employee has an IRA. The analysis of these two data sources concluded IRA balances as a multiple of pay for full-career contributors were not material enough to incorporate into the study. Therefore, IRAs as a source of private resources at retirement have not been considered in this study.
- Generally, the study analyzes only the pension structures currently offered by employers, assuming the current pension formulas have always been in effect.
- This may result in some level of understatement of retirement resource amounts, because closed or frozen prior plans may have provided more valuable benefits than those currently provided. However, because the value of frozen or grandfathered benefits erodes over time and because this study projects benefits to age 67 in the baseline scenario, we assume such understatement to be of minimal impact for the aggregate results.
- The study does not reflect employer-provided benefits other than tax-qualified defined benefit and defined contribution retirement plans. As a result, it does not reflect any value for other employer-sponsored plans that might contribute to employees' retirement resources (such as stock purchase plans, stock option plans, health savings accounts, and nonqualified retirement benefits) or other sources of wealth that are not employer-sponsored (such as net housing wealth).

Defining Retirement Income Adequacy

Defining Retirement Income Adequacy

Surpluses and shortfalls are depicted with gray colors throughout *The Real Deal*.

Surplus or Shortfall
The amount by which retirement resources exceed or fall short of needs

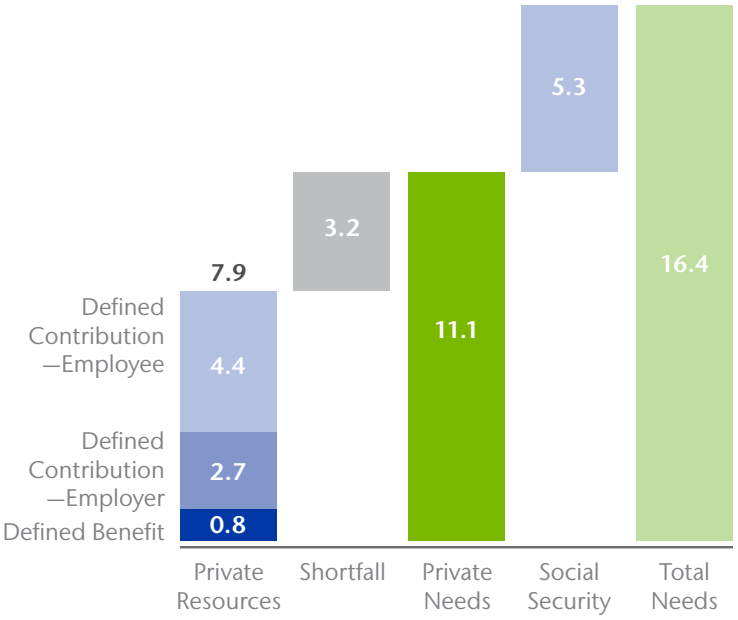
The Real Deal can analyze retirement income adequacy based on the surplus or shortfall of retirement resources versus retirement needs.

- **If retirement resources exceed retirement needs,** then the individual can anticipate a retirement income surplus through an average postretirement lifetime.
- **If resources are not sufficient to cover needs,** then the individual can anticipate a shortfall, and may need to consider some combination of actions, including increasing retirement resources prior to retiring, reducing their standard of living in retirement, or retiring at a later age. Each of these actions is explored in the study's alternative scenarios.

The average shortfall of 3.2 times pay at retirement, as shown in Figure 10, indicates that many employees may need to save more, retire later, or expect to maintain a lower standard of living during retirement.

Retirement Resources Versus Needs (Figure 10)

Baseline
Full-Career Contributing Employees at Retirement Age 67



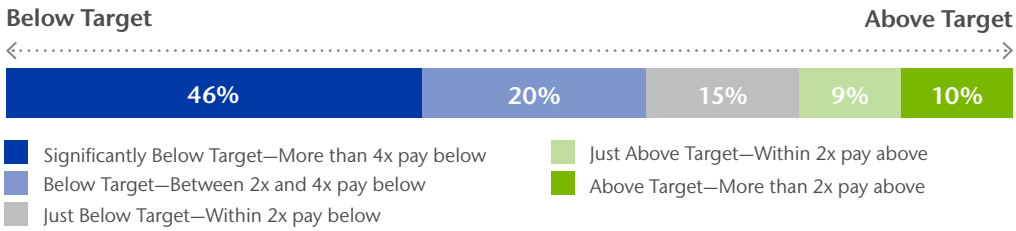
Our analysis does not include all assets individuals may have set aside for retirement, and it does not reflect every possible retirement need. Even so, this study provides a reasonable way to evaluate how effectively current employer-sponsored benefits and Social Security might financially prepare employees to have adequate retirement income throughout retirement.

Defining Retirement Income Adequacy (cont'd.)

Figure 11 illustrates the distribution of the surpluses and shortfalls for full-career contributing employees.

Distribution of Retirement Income Surplus/Shortfall (Figure 11)

Baseline
Full-Career Contributing Employees at Retirement Age 67

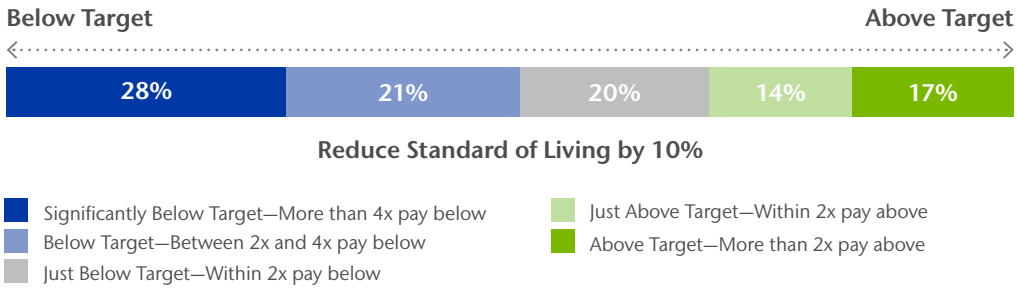


- This graph reveals that **1 out of 5** employees (19%) is expected to have a surplus at retirement.
- Another 15% may have resources that are close to, but do not exceed, their needs. These employees will likely have to make some lifestyle adjustments to eliminate their retirement income gap.
- The **remaining 2 in 3** (66%) fall short and are unlikely to be able to retire comfortably at age 67.

Naturally, it is not easy to define "adequate" retirement income. We acknowledge the active debate about what constitutes an adequate level of income at retirement and how much retirees may need throughout their postretirement lifetimes. There is a range of retirement income levels that individuals are willing to accept as being adequate. For example, a 10 percent cut might be palatable. As shown in Figure 12, when full-career contributors target only 90 percent of their preretirement standard of living, the percentage who are on track for an age 67 retirement jumps from 34 percent to 51 percent.

Distribution of Retirement Income Surplus/Shortfall (Figure 12)
Reduce Standard of Living by 10% Versus Baseline

Baseline
Full-Career Contributing Employees at Retirement Age 67

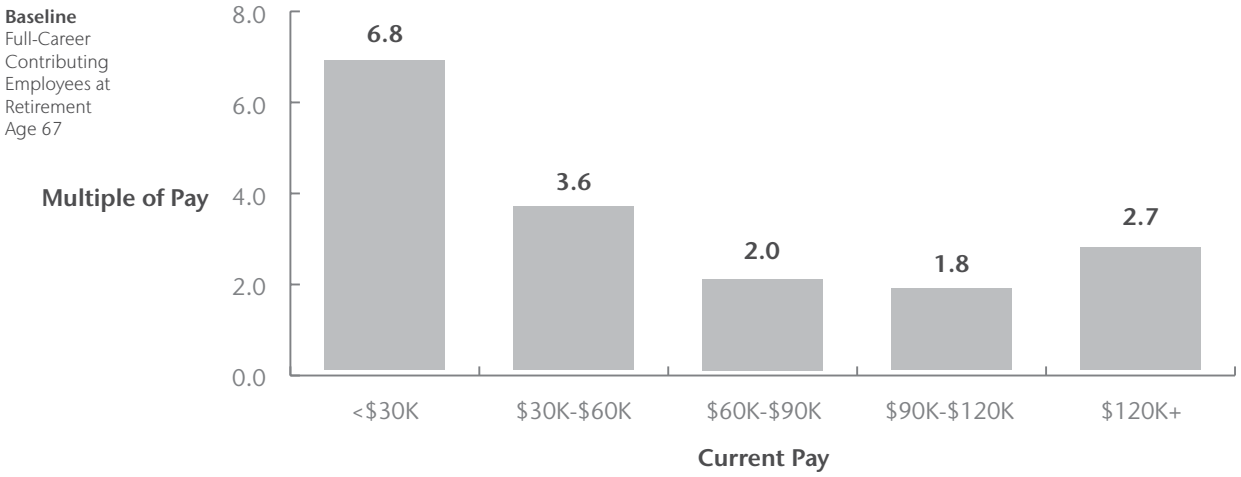


Defining Retirement Income Adequacy (cont'd.)

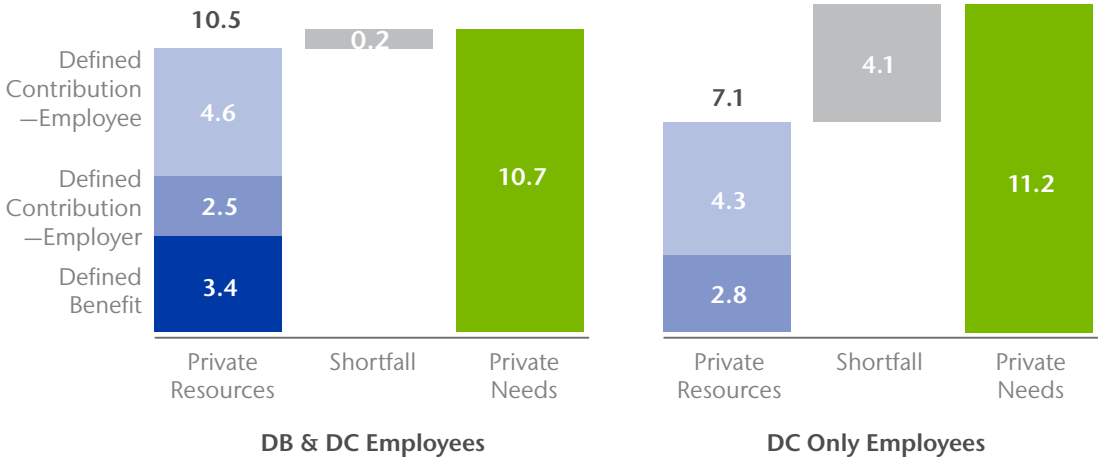
Figure 13 demonstrates the variance of shortfalls at different pay levels (at an age 67 retirement, no pay groups have a surplus, on average). The largest projected shortfalls occur at the lower pay levels, since these participants have the highest needs but are not able to save sufficiently to meet those needs.

The graph also reveals a greater shortfall for the highest pay level, which is the result of a higher private needs target and the legislated limits for tax-qualified retirement plans. *The Real Deal* does not include the value of equity-based compensation or nonqualified retirement benefits, which will likely improve the retirement readiness of many higher-income workers.

Retirement Income Shortfalls by Current Pay (Figure 13)



Private Resources Versus Private Needs (Figure 14) Employees with DB and DC Versus Employees with DC Only



Due to the variations in demographics and in employer-provided resources available by industry, we see large variations in retirement readiness across industries.

Replacement Ratios and Multiples of Pay

The analysis expresses retirement needs and resources as a multiple of projected pay at retirement. Through this approach, *The Real Deal* can compare the retirement resources and needs of people retiring at different times in the future.

Traditionally, retirement adequacy was expressed in terms of replacement ratios—the income needed in the first year of retirement as a percentage of income earned right before retirement. The replacement ratio measure focused solely on income adequacy at the point of retirement. It did not consider subsequent adequacy. In contrast, a multiple-of-pay approach provides a target that enables employees to maintain their preretirement standard of living throughout all their retirement years, rather than merely in the first year of retirement.

Transitioning from replacement ratios to multiples of pay is a natural evolution, since the percentage of retirement income provided through defined contribution plans has started to exceed the percentage provided through traditional defined benefit plans. The multiple-of-pay target is much more useful and understandable to employees who are working with a defined contribution plan as the primary source of their retirement income. This measure also allows the study to reflect future inflation and medical trends, which cannot be captured in a year-of-retirement replacement ratio.

Assumptions and Data

Assumptions Used in Projections

The assumptions used in this analysis drive the outcomes.

- **Baseline assumptions** for *The Real Deal* represent a reasonable basis for determining likely retirement income adequacy for a large population of employees. Outcomes will vary based on actual events.
- **Alternative scenarios** evaluate the sensitivity of the results versus the baseline assumptions and model the impact of various changes employees and employers could make in an effort to improve retirement income adequacy.

The table below summarizes the baseline assumptions and alternative scenarios considered. Please consult the companion papers to *The Real Deal* for alternative scenarios not discussed in the primary paper.

	Baseline Assumption	Alternative Scenarios
Covered employees	All full-career (hired by age 35) employees currently contributing (nonzero contribution rates) on 1/1/2017	Analysis of all contributing employees
Retirement age	67	60, 62, 65, 70, 75
Employee contribution rates	Actual rates as of 1/1/2017, including automatic increases	Actual individual rates plus 5%; automatic escalation of participants with rates below 10%
Employer contribution rates	Contributions derived from plan formulas, both matching and nonelective or "profit sharing" contributions	Same as baseline
Preretirement rate of return	6% annual (nominal) rate of return (net of fees)	5% and 7%
Postretirement rate of return	5% annual (nominal) rate of return (net of fees)	4% and 6%
Annuitization rate	Not applicable to baseline	4% immediate; 4.5% deferred to 85
General inflation	2.25% pre- and postretirement	Same as baseline
Employer's retiree medical benefit	Access only, with retiree paying 100% of the group-rated cost of coverage	Same as baseline
Medical inflation	5.5% per annum	Same as baseline
Pay growth	3.75% per annum (inflation plus 1.5%)	Same as baseline
National wage base increase rate	2.75% per annum (inflation plus 0.5%)	Same as baseline
Plan fees	0.5% of assets per annum	Same as baseline
Postretirement mortality	50th percentile life expectancy from the headcount-weighted RP-2006 table projected with MP-2017 scale for healthy annuitants projected generationally (i.e., approximately age 90 for females and age 88 for males)	80th percentile life expectancy from the headcount-weighted RP-2006 table projected with MP-2017 scale for healthy annuitants projected generationally (i.e., approximately age 98 for females and age 96 for males)
Asset decumulation method	Drawdown of assets to life expectancy	Annuitization of DC balance; drawdown to age 85 plus purchase of deferred-to-age-85 life annuity with DC balance
Retirement needs	Maintain standard of living	Reduce standard of living by 10%
Tax provisions	Reflect current law (the Tax Cuts and Jobs Act), including expiration of individual rate changes	Assume provisions of the Tax Cuts and Jobs Act are permanent
Social Security	Reflect current law	Assume Social Security payments are reduced to 75% of current law in 2034+; defer Social Security to age 70

Details of Assumptions

- **Covered employees.** The focus of this study is on full-career employees who are actively participating in their employer-sponsored defined contribution plans. Full-career employees are those who began work at their current company by age 35 and therefore will have 32 or more years of service at age 67. Employers that design their plans with retirement income adequacy in mind generally design their plans for a full-career hire.

  Mid-career hires are excluded from the core analysis of the study (although these results are available for benchmarking purposes). Mid-career hires may exhibit lower retirement income adequacy than those who stay at a company for a full career because they have shorter service in their current employer's plans. Some of these participants may have accumulated retirement assets through prior employers that would improve their retirement income adequacy results. Others may not have saved their small-amount cash-outs or rollovers for retirement, but instead spent these benefits immediately.

  The study excludes employees who are not currently contributing to their defined contribution plans. This includes those who previously participated in their employer-sponsored plans but who are no longer saving in the plan. Some of these employees have defined contribution balances from previous contributions or from employer contributions that do not require employee contributions. Understanding the reasons why employees fail to actively participate in their plans, and increasing plan utilization by such employees, is clearly a critical topic of study.
- **Family status.** The study concentrates on the resources and needs of an individual, rather than those of a couple or a family.
- **Retirement ages.** Age 67 has become a more realistic retirement age and corresponds to the unreduced Social Security normal retirement age for most employees; therefore, an age 67 retirement is the baseline retirement age assumption.

  Ages 60, 62, and 65 are also included because a significant number of working employees do plan to retire before age 67 or are forced to by medical or family care reasons. Additionally, 62 is the first age at which Social Security benefits are available, albeit reduced, and many employees see this as a signal for an appropriate age at which to retire.

  Ages 70 and 75 are included because some employees may not be able to retire by age 67, and there can be significant benefit to waiting three or more years. Also, age 70 is the latest age before required minimum distributions from qualified plans begin.

  Analyzing this wide range of retirement ages allows for the determination of each employee's "age of adequacy," the retirement age at which the shortfall of retirement resources versus retirement needs is eliminated.
- **Employee contribution rates.** This study uses actual contribution rates, including automatic contribution increases where elected. Also modeled are the impact of an overall contribution rate increase of 5 percentage points and the impact of automatically escalating every employee by 1 percentage point per year up to 10 percent.

Details of Assumptions (cont'd.)

- **Preretirement rate of return.** The preretirement investment return assumption (6 percent per year) is a long-term dollar-weighted average rate of return, net of fees, based on a balanced portfolio of stocks and bonds. The portfolio is assumed to shift from primarily stocks to primarily bonds over the course of an employee's career. The pattern of de-risking reflected in the rate of return assumption is intended to simulate a gradual transition from risky assets to stable assets as the employee nears retirement. This rate of return is similar to what the typical employee would expect to earn if invested in an average target date fund for their entire career.

  Each account balance in *The Real Deal* was rolled forward from Jan. 1, 2017, to Jan. 1, 2018, at 15 percent, reflecting the average DC account return during the year. Thereafter, each account balance is assumed to earn a fixed rate of 6 percent from Jan. 1, 2018, until retirement.

  The assumed 6 percent rate of return is subject to a variety of risks. The closer an employee is to retirement, the greater the risk associated with assuming a static rate of return, since shorter investment horizons typically exhibit greater volatility in returns. In addition, individual participants may be invested more or less aggressively than the average participant. Furthermore, investments in a single security such as employer stock could result in significantly greater volatility, and would be expected to earn a lower risk-adjusted return than a diversified stock portfolio.

  The variability of investor behavior across the population is a worthy subject for further study. The risks and returns associated with an individual's specific investment decisions can have a material impact on their level of retirement resources. However, for the purposes of evaluating retirement income adequacy for a diverse population, a consistent rate of return is applied to all employees.

  Scenarios representing a 1 percentage point increase and a 1 percentage point decrease in the assumed rate of return are included in order to show the sensitivity of retirement income adequacy to the assumed rate of return.

- **Postretirement rate of return.** The postretirement investment return assumption (5 percent per year) is developed similarly to the preretirement rate of return. The assumption is based on average returns (net of fees) over a retiree's lifetime, as opposed to average returns over an employee's career. The underlying portfolio is assumed to continue transitioning from risky assets to stable assets as the retiree ages, on par with the average target date fund.

  Scenarios representing a 1 percentage point increase and a 1 percentage point decrease in the assumed rate of return are included in order to show the sensitivity of retirement income adequacy to the assumed rate of return.

- **Annuitization rate.** For scenarios in which an annuity is assumed to be purchased from an insurer, an annuity purchase rate of 4 percent is assumed for immediate annuities and an annuity purchase rate of 4.5 percent is assumed for deferred-to-age-85 annuities.

Details of Assumptions (cont'd.)

- **Inflation and pay growth.** These assumptions are consistent with assumptions frequently used by employers in reviewing their retirement plans.[2] Each of these assumptions—and the 1.5 percentage-point spread between them (3.75 percent salary growth, 2.25 percent inflation)—represent reasonable long-term assumptions for a large (and disparate) population. The 2017 pay is capped at the $270,000 limit imposed by the Internal Revenue Code on pay that can be considered by a qualified plan. The pay limit is assumed to grow at the national wage base assumption of 2.75 percent. Similarly, employees' deferrals to their defined contribution plans are subject to the annual limits, which are $18,000 (plus $6,000 for those age 50 or older) for 2017. These limits are assumed to grow at the 2.25 percent general inflation assumption.
- **Medical inflation.** This assumption is a single-point rate (5.5 percent) derived from Thomas Getzen's long-term health care cost trends model as commissioned by the Society of Actuaries. The single-point trend rate (as opposed to tables used in ASC 715-60 accounting) is appropriate in conjunction with the assumption that nonmedical needs also increase by a single inflationary component through retirement.
- **Postretirement mortality.** The study converts annuities to present values assuming the average employee will need to have an income stream until their 50th percentile lifetime from retirement age based on the headcount-weighted RP-2006[3] healthy annuitant mortality table projected generationally with Scale MP-2017 (e.g., age 90 for females and age 88 for males currently age 42 and retiring at age 67). Participants born in different years will have different life expectancies at retirement age, with younger participants expected to live longer.

Additionally, the possibility retirees will self-insure against longevity risk by spreading their retirement resources until the 80th percentile of life expectancy (e.g., age 98 for females and age 96 for males currently age 42 and retiring at age 67) is considered.

[2] *See https://www.soa.org/research-reports/2016/research-hlthcare-trends/.*

[3] *"RP-2006" refers to the 2006 base rates in the RP-2014 mortality study from the Society of Actuaries.*

Participants Included in the Study

Data was collected as of Jan 1, 2017, from Aon's Benefit Index®, Alight Solutions, and the U.S. Bureau of Labor Statistics (BLS). The data received from these three sources was united to create a comprehensive population to represent employee demographics, retirement savings behavior, and investment experience at U.S. plan sponsors. As a result of our process, we are able to analyze retirement adequacy across nearly 30 industries, which are described later in this paper.

Core Population Data

Aon's Measurement practice has gathered census data from a broad range of organizations to create large, comprehensive populations characteristic of employees across various industries. To facilitate the use of these populations, they are subsequently sorted into representative sets of age, service, gender, and pay.

Within *The Real Deal*, the Benefit Index data serves as the basis for the demographic data (e.g., age, pay, service, gender). Data from the Benefit Index population industries noted above was used to create a distribution of representative employees for each of nearly 30 industries. Each industry population was composed of up to 25,000 records.

Defined Contribution Behavior and Experience Data

Alight Solutions (formerly a division of Aon) provided 1.3 million individual records including defined contribution account balances, savings rates, and automatic escalation elections. This data was used to develop probabilities of participation in various defined contribution features and the distribution of defined contribution savings rates and current balances.

This data was organized by age, service, pay, gender, and industry to summarize average employee defined contribution balances and a distribution of savings rates, and then combined with the core population data described above. The blend of core population data and DC experience data allows us to generate a representative population for each industry.

Modeling the U.S. Plan Sponsor Population

BLS employee data by industry was used to determine appropriate weights for each industry profile in order to generate a complete data set characteristic of the entire U.S. plan sponsor-employer workforce.

Industry	BLS Percentage of Employees
Accounting	1.3%
Aerospace	0.9%
Agriculture	3.1%
Automotive	4.6%
Banking and Finance	5.1%
Building Materials	2.2%
Chemicals	0.9%
Electronics	1.3%
Energy, Oil, and Mining	1.3%
Engineering and Construction	2.8%
Food and Beverage	3.3%
Food Service	10.5%
Forest Products and Packaging	1.5%
Health Care Services and Hospitals	7.9%
Hotels, Resorts, and Casinos	3.9%
Industrial Equipment	2.2%
Insurance	3.2%
Media and Entertainment	3.3%
Medical Products	0.7%
Personal and Consumer Products	4.0%
Pharmaceuticals	0.9%
Publishing and Printing	0.6%
Research and Testing	3.1%
Retail Distribution	17.1%
Technology	5.9%
Telecommunications	0.2%
Transportation	6.7%
Utilities	1.5%
Total	**100.0%**

Company Retirement Benefit Data Included in the Study

Employer-provided defined benefit and defined contribution benefits were applied to each employee in the study based on the average benefits provided within their industry.

Benefit SpecSelect™ Data

Defined benefit and defined contribution plan prevalence data was used from Aon's Benefit SpecSelect database. This data was reviewed by industry to study industry-specific average plan features and availability.

Defined Benefit

- Probability of defined benefit plan being offered
- Median percentage of pay delivered to a participant

Matched Savings

- Probability of matched savings plan being offered
- Median defined contribution match provided to a participant
- Contribution escalation availability[1] within the industry and target escalation percentages

Noncontributory Savings

- Probability of noncontributory savings plan being offered
- Median contribution provided to a participant

[1] *Supplemental contribution escalation prevalence data from the Callan Institute's 2018 Defined Contribution Trends Survey: http://www.callan.com/wp-content/uploads/2018/01/Callan-2018-DC-Survey.pdf*

Population Demographics

Who are Full-Career Contributors?

- Hired by age 35
- Potential for 32+ working years by age 67
- Saving in the DC plan

This study focuses on the projected retirement resources and needs of "full-career contributors" at U.S. plan sponsors. These are employees who started with their current company by age 35—with a potential career of 32 or more years by age 67—and are currently saving in their defined contribution plan.

The Real Deal focuses on this group to:

- Analyze the effect of an employer's retirement benefits as if they were delivered through a full career (not because we necessarily expect these individuals to stay with the same employer for 32 or more years).
- Avoid a possible skewing of results due to lack of information regarding benefits earned during prior employment. Mid-career hires or shorter-service employees cannot show the full effect of retirement programs since our data does not consistently reflect all benefits provided throughout their full careers.

	Average Age	Average Service	Average 2017 Pay	Average DC Employee Contribution	Average DC Employer Contribution	Average DC Account Balance	Percentage of Total
Full-career contributors	38	12	$84,000	7.7%	4.9%	$131,000	66%
Contributors	42	11	$84,000	7.9%	4.9%	$119,000	100%
Full-Career Contributors							**Percentage of Full-Career Contributors**
Females	37	11	$70,000	7.2%	4.6%	$94,000	49%
Males	39	13	$96,000	8.1%	5.1%	$165,000	51%
DB and DC employees	42	16	$98,000	8.4%	4.7%	$190,000	23%
DC only employees	37	11	$79,000	7.4%	4.9%	$113,000	77%
Contribution escalation	33	7	$76,000	7.3%	5.3%	$57,000	12%
No contribution escalation	39	13	$85,000	7.7%	4.8%	$141,000	88%

To analyze the results for all contributing employees, the study also includes employees who are contributing but were hired after age 35.

Workers who use their employer plans well and use them consistently over the course of their careers have the potential to accumulate significant retirement resources. However, those employees not contributing to their defined contribution plans (approximately 25 percent of the workforce at U.S. plan sponsors) face a much less encouraging outlook. While employers should target these employees using automatic features and communication campaigns to help them start to accumulate retirement income, it is generally not constructive to quantify the shortfalls of these employees; therefore, they have been excluded from this analysis.

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