

Aon Consulting's  
**2008 Replacement Ratio Study™**  
A Measurement Tool For Retirement Planning

# A Measurement Tool for Retirement Planning

For twenty years, Aon Consulting and Georgia State University have published data on retirement income needs. The **Replacement Ratio Study**<sup>™</sup> has become a premier source of retirement planning information for employers, employees, and their advisors. The **2008 Replacement Ratio Study** is the seventh update of this report and builds on a 1980 edition issued by the President's Commission on Pension Policy.

In this edition of the study, we continue to recognize the movement toward defined contribution plans that was initially reflected in the 2004 report. Thus, this report adds a section analyzing how a retiree might spend their savings account after retiring. Retirees without traditional pension benefits will have to take more responsibility, not only to plan for their retirement, but also to live off their account during retirement.

This study was completed under the direction of Dr. Bruce Palmer, Professor and Chair Emeritus of the Department of Risk Management and Insurance, Robinson College of Business, Georgia State University. Aon Consulting's Ron DeStefano (alumnus), E.A., Michael Schachet, F.S.A., Jeff Paciero, F.S.A., and Chris Bone (alumnus), F.S.A., worked closely with Dr. Palmer in the completion of this study.

## Questions About the Study

If you have any questions about how the study may be applied as a planning tool (either as the plan sponsor or on an individual level), you can contact your Aon consultant or visit [www.aon.com/retire](http://www.aon.com/retire).

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# Introduction

When Kathleen Casey-Kirschling applied for Social Security benefits on October 15, 2007, she became the first baby boomer to apply for Social Security. The baby boomers represent about 28 percent of the U.S. population and, during the next 19 years, most of them will become eligible for Social Security benefits and will be thinking about retirement.

Many of these future retirees are not financially prepared to retire. In fact, many do not know what they need to do to prepare. This uncertainty comes at a high cost. Employees may have to delay retirement and/or accept a lower standard of living when they retire. The implications are becoming even more severe as many private employers are largely abandoning the defined benefit retirement system and passing a greater share of retiree medical costs on to their retirees. Also, while the stock markets have largely recovered from their 2002 lows, future returns continue to be unpredictable. This and other uncertainties make planning withdrawals from defined contribution plans very challenging.

Some employers have even stepped away from retirement education, leaving the burden to plan with the employee. Others, encouraged by recent legislation, feel a fiduciary responsibility to help employees plan a financially secure retirement. All employers, however, should realize that the shape of their future workforce will depend to a measurable degree on how many of their existing employees will retire in the next decade.

This 2008 update continues to answer the original question, "How much income will I need at retirement to maintain my standard of living?" It also addresses the question, "How much capital do I need to accumulate by retirement?", which was introduced in the 2004 update. To answer the latter question in 2004, we assumed that accumulated amounts would be annuitized, rather than invested. In this 2008 update, we also look at the pros and cons of managing an individual account, rather than buying an annuity at retirement. An employee who receives a lump-sum settlement from a defined benefit pension plan may also find this discussion of value.

# Replacement Ratio Defined

A Replacement Ratio is a person's gross income after retirement, divided by his or her gross income before retirement. For example, assume someone earns \$60,000 per year before retirement. Further, assume he or she retires and receives \$45,000 of Social Security and other retirement income. This person's replacement ratio is 75 percent (\$45,000/\$60,000).

This study analyzes the replacement ratio employees need to maintain their pre-retirement standard of living after retirement. Generally, a person needs less gross income after retiring, primarily due to four factors:

1. Income taxes go down after retirement. This is because extra deductions are available for those over age 65, and taxable income usually decreases at retirement.
2. Social Security taxes (FICA deductions from wages) end completely at retirement.

3. Social Security benefits are partially or fully tax-free. This reduces taxable income and, therefore, the amount of income needed to pay taxes.
4. Saving for retirement is no longer needed.

In addition to the factors described above, changes in age- and work-related expenditures that occur at retirement also influence the amount of income someone needs at retirement. Changes in these expenditures, however, vary from person to person.

The chart below shows that a 78 percent Replacement Ratio would allow an employee earning \$60,000 to retire at age 65 in 2008 without reducing his or her standard of living. Because taxes and savings decrease at retirement, this person is just as well off after retirement with a gross income of only \$46,972.

Replacement Ratio for Employee Earning \$60,000 Who Retires at 65

	Annual Income		Replacement Ratio ② / ①
	Before Retirement	After Retirement	
	①	②	③
Gross Income	\$60,000	\$46,972	78%
(Taxes)*	(10,967)	(49)	
(Savings)**	(2,225)	0	
(Age- & Work-Related Expenditures)***	(34,253)	(34,368)	
Amount Left for Other Living Expenses	12,555	12,555	

\* Tax rates and Social Security amounts are based on the laws in effect on January 1, 2008.

\*\* Savings are assumed to stop at the time of retirement.

\*\*\* See Appendix III for details about assumed age- and work-related expenditures.

Appendix I describes the methodology used to determine the needed replacement ratios. Appendix II shows the calculation details for our baseline cases, and Appendix III summarizes the expenditure data used for the calculations.

The primary data source for this information is the U.S. Department of Labor's Bureau of Labor Statistics' Consumer Expenditure Survey (CES). This is essentially the same database that is used to construct the Consumer Price Index. The CES is done annually, and we used data from the most recent years available—2003, 2004, and 2005. This data includes information on approximately 12,823 "working" consumer units and 6,498 "retired" consumer units. In total, this represents approximately 25 percent more consumer units than has been available in prior updates.

# 2008 Baseline Case Results

The table, below, shows the baseline case results for the 2008 update. The baseline case assumes a family situation in which there is one wage earner who retires at age 65 with a spouse age 62. Thus, the family unit is eligible for family Social Security benefits, which are 1.375 times the wage earner's benefit. The baseline case also takes into account age- and work-related expenditure changes after retirement, in addition to pre-retirement savings patterns and changes in taxes after retirement.

## 2008 Replacement Ratio Findings

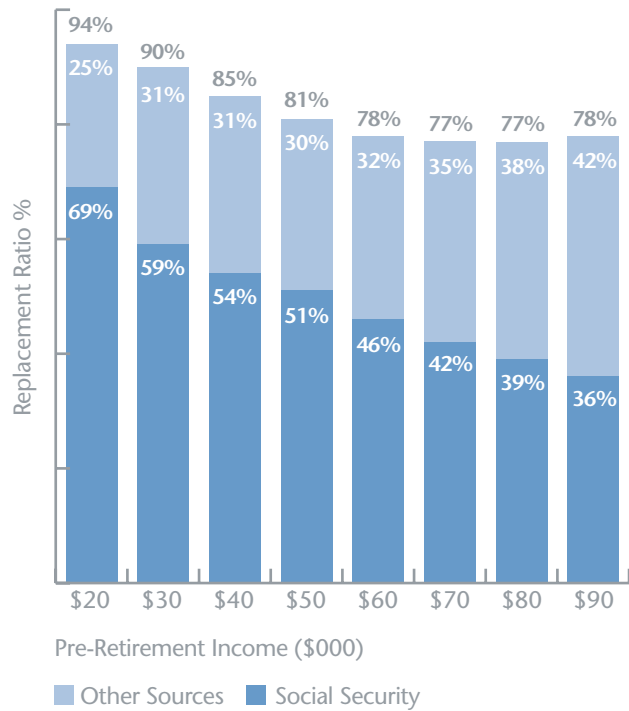
Pre-Retirement Income (\$000)	Replacement Ratios		
	Social Security (%)	Private and Employer Sources (%)	Total (%)
20	69	25	94
30	59	31	90
40	54	31	85
50	51	30	81
60	46	32	78
70	42	35	77
80	39	38	77
90	36	42	78

The graph on the following page illustrates three significant points about the Replacement Ratio calculations:

1. Social Security replaces a larger portion of pre-retirement income at lower wage levels. This is by design and has the effect of redistributing income from higher paid employees to lower paid.
2. Total Replacement Ratios that are required to maintain a person's pre-retirement standard of living are highest for the very lowest paid employees. This is primarily for two reasons. First, before they retire, lower paid employees save the least and pay the least in taxes as a percentage of their income. Thus, they spend a higher percentage of their income and need higher Replacement Ratios to maintain that level of expenditures. Second, age- and work-related expenditures do not decrease by as much, as a percentage of income, for the lower paid employees. This also means they need more income after retirement (as a percent of their pre-retirement income) than the higher paid employees.
3. After reaching an income level of \$60,000, the total required Replacement Ratios remain fairly constant at 77 percent – 78 percent. This is primarily because post-retirement taxes increase as income levels increase. Post-retirement taxes increase from 0.1 percent of post-retirement income for a \$60,000 person to 6.7 percent for a \$90,000 person. To pay the additional taxes, higher paid employees need more retirement income.

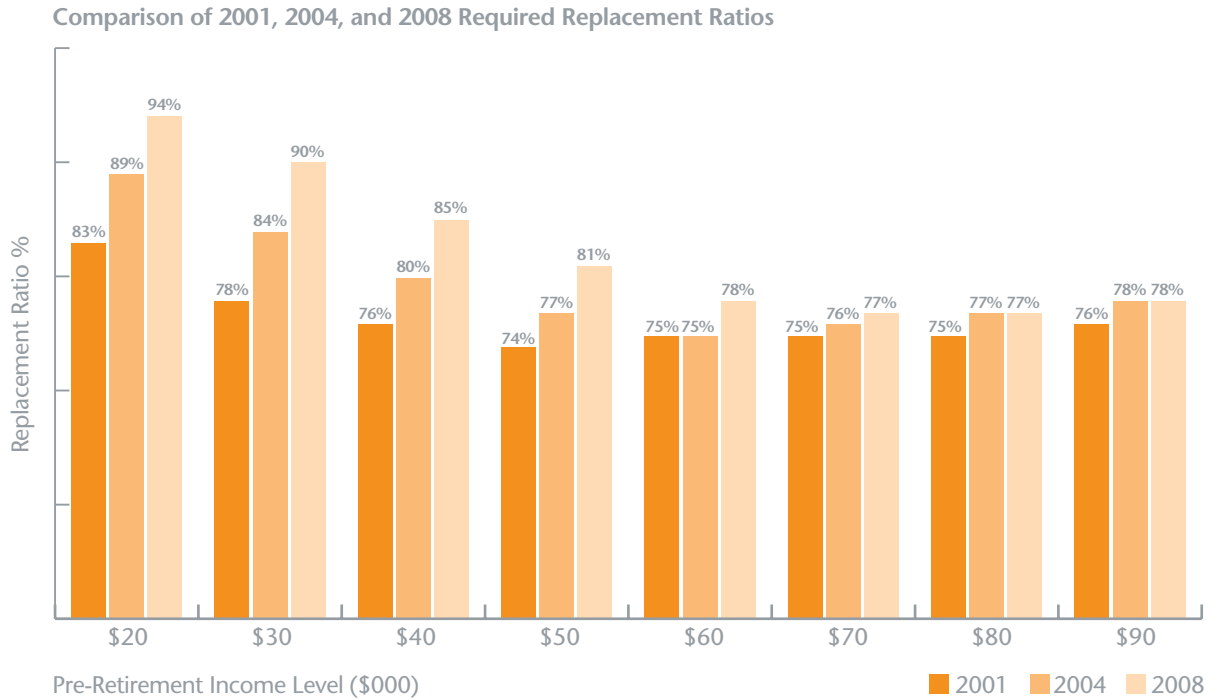
One reason the highest income employees pay more tax after retirement is that as much as 85 percent of a married couple's Social Security benefit is taxable when retirement income (including 50 percent of Social Security) goes above \$44,000. It is important to note the \$44,000 threshold is not indexed like other tax breakpoints. As time goes on, automatic indexing of Social Security benefits will continue to increase the dollar amount of those benefits. In relative terms, more and more of a person's Social Security benefit will be taxed.

Required Replacement Ratios Broken Down by Social Security and Other Sources



# 2008 Baseline Results Compared to Prior Studies

The graph below compares the 2008 baseline results with the 2004 and 2001 results. The needed Replacement Ratios increased from 2001 to 2004 and again from 2004 to 2008.



The increase in required replacement ratios from 2004 to 2008 occurred primarily at income levels of \$60,000 and below. According to the most recent CES data, employees at these income levels were not able to reduce their expenditures at retirement by as much as in prior years. This means that they now need higher replacement ratios to maintain their standard of living. The two largest expenditure categories for employees earning \$60,000 or less are shelter and transportation. As shown in the table below, the percentage reduction in these expenditures that occurs at retirement was significantly less according to the most recent CES data than according to the data used in 2004.

Percent Reduction in Expenditures 2004 and 2008		
CES Data Used	Percentage Reduction in Expenditures That Occurs at Retirement	
	Shelter (%)	Transportation (%)
2004 Study	22.4	10.0
2008 Study	15.6	3.6

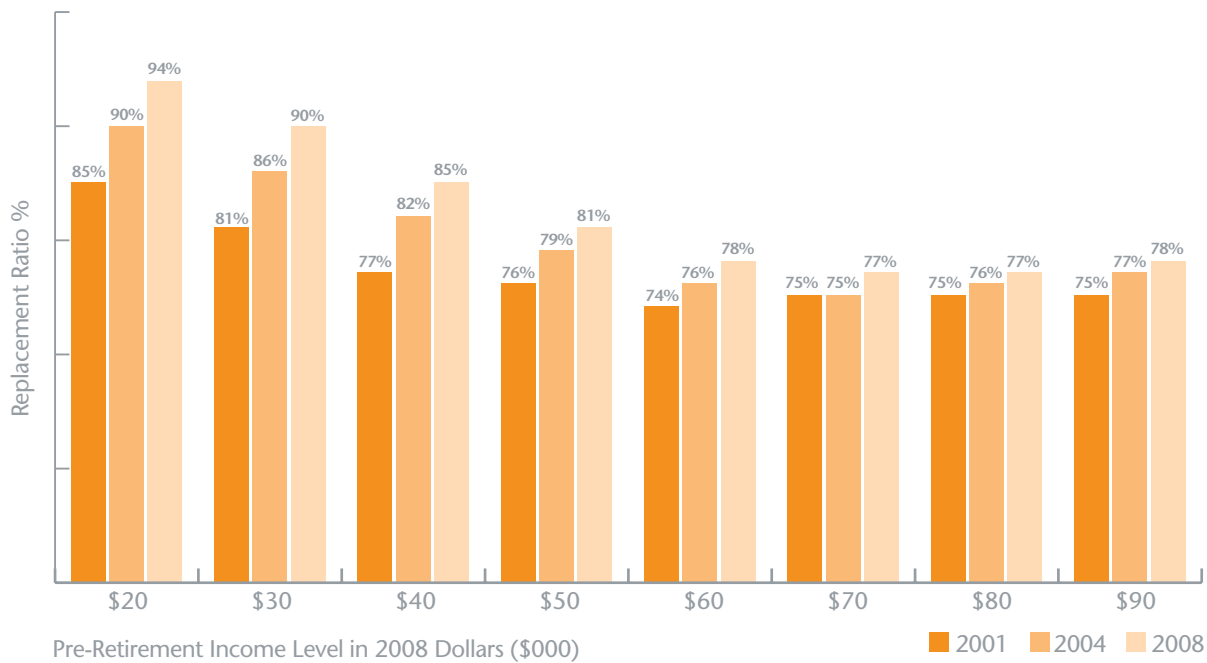
Expenditure details are shown in Appendix III.



In addition to expenditure changes, indexed tax brackets generally allow employees to pay less in income tax in 2008 than they paid in 2004. At income levels up to \$60,000, this generally accounts for an increase in required replacement ratios of approximately 1 percent. For example, taxation changes alone caused the required replacement ratio for a person earning \$30,000 to increase from 84 percent in 2004 to 85 percent in 2008. Expenditure changes caused the rest of the increase to 90 percent.

It should be noted that inflation creates a slight distortion in the comparisons. For example, a \$50,000 wage earner in 2008 may have been earning approximately \$44,000 in 2004, and only \$41,000 – \$42,000 in 2001. Thus, it may be more appropriate to compare a person earning \$50,000 in 2008 with a person earning \$44,000, rather than \$50,000, in 2004. The following chart makes this adjustment. It compares the current study's results with adjusted results from prior studies, where adjustments are made for inter-period inflation.

Comparison of 2001, 2004, and 2008 Required Replacement Ratios, Adjusted for Inflation



## 2008 Baseline Results Compared to Prior Studies *(continued)*

The table below compares the 2004 and 2008 results, including the percentage of income expected to be replaced by Social Security. The table shows that even though the total amount of income needed at retirement is as much as 6 percent higher in 2008 than in 2004, the amount to be provided by private sources increases by no more than 3 percent, and it actually decreases at all income levels over \$60,000. This is because Social Security is expected to replace a larger percentage of pre-retirement income in 2008 than in 2004.

**Replacement Ratios from the Current and Prior Studies**

Pre-Retirement Income (\$000)	2008 Study			2004 Study		
	Social Security (%)	Private and Employer Sources (%)	Total (%)	Social Security (%)	Private and Employer Sources (%)	Total (%)
20	69	25	94	65	24	89
30	59	31	90	56	28	84
40	54	31	85	51	29	80
50	51	30	81	48	29	77
60	46	32	78	43	32	75
70	42	35	77	39	37	76
80	39	38	77	35	42	77
90	36	42	78	33	45	78

# Baseline Compared to Tax-Only and Tax-and-Savings Models

Savings and expenditure changes can vary significantly by individual. Thus, it may be appropriate to start with a replacement ratio calculation that disregards these changes, and adjust the calculation on an individual basis. The graph on page 8 shows the baseline Replacement Ratios, and the comparable Replacement Ratios disregarding expenditure changes, and disregarding both expenditure and savings changes.

If a person's savings and expenditures do not change at retirement, the Replacement Ratios needed to maintain the person's standard of living are shown by the A bars. To the extent the person saved before retirement and stopped saving at retirement, the Replacement Ratios decrease. If the person was an average saver, the Replacement Ratios would decrease as shown by the B bars. If the person saved more than average, the Replacement Ratios would decrease even further—to a point below the B bars.

After adjusting for savings, the next step is to adjust for changes in the person's age- and work-related expenditures at retirement. If these expenditures change by an average amount at retirement, the Replacement Ratios would be those represented by the C bars. These are the levels referred to as the "baseline" case on page 2. If age- and work-related expenditures decrease at retirement by more than average, the resulting Replacement Ratios would be less than those shown by the C bars.

Important observations from this analysis include:

- If an individual's expenditure and savings amounts do not change at retirement, needed Replacement Ratios (A bars on the left) range from 83 percent – 91 percent, versus the baseline of 77 percent – 94 percent (C bars on the right). The largest difference is for people at the highest income levels. This is because these people saved the most before retirement and are also expected to have the largest reduction in their expenditures at retirement. Together, these factors significantly decrease their required replacement ratios. For example, these factors decrease the required replacement ratio for a person earning \$90,000 from 87 percent to 78 percent.
- Line (10) of Appendix III shows that expected expenditures increase at retirement for lower income people but decrease for higher income people. This is because, unlike their higher income counterparts, lower income people are not expected to be able to reduce their shelter and transportation expenses by enough at retirement to offset the increased cost of health care. Since their expected expenditures increase at retirement, so do their needed replacement ratios. This can be seen by comparing the C bars in the following chart (which reflect the expected expenditure changes) with the B bars (which do not reflect expected expenditure changes). The C bars are higher than the B bars for lower income people, but lower for the higher income people.

Baseline Compared to Tax-Only and Tax-and-Savings Models (continued)



# Baseline Case and Adjustments for Other Family Situations

The baseline family situation for this study is one wage earner retiring at age 65 with a spouse three years younger. The following table shows adjustments that should be made to the baseline Replacement Ratio targets to reflect three other family situations. The adjustments are driven by three factors:

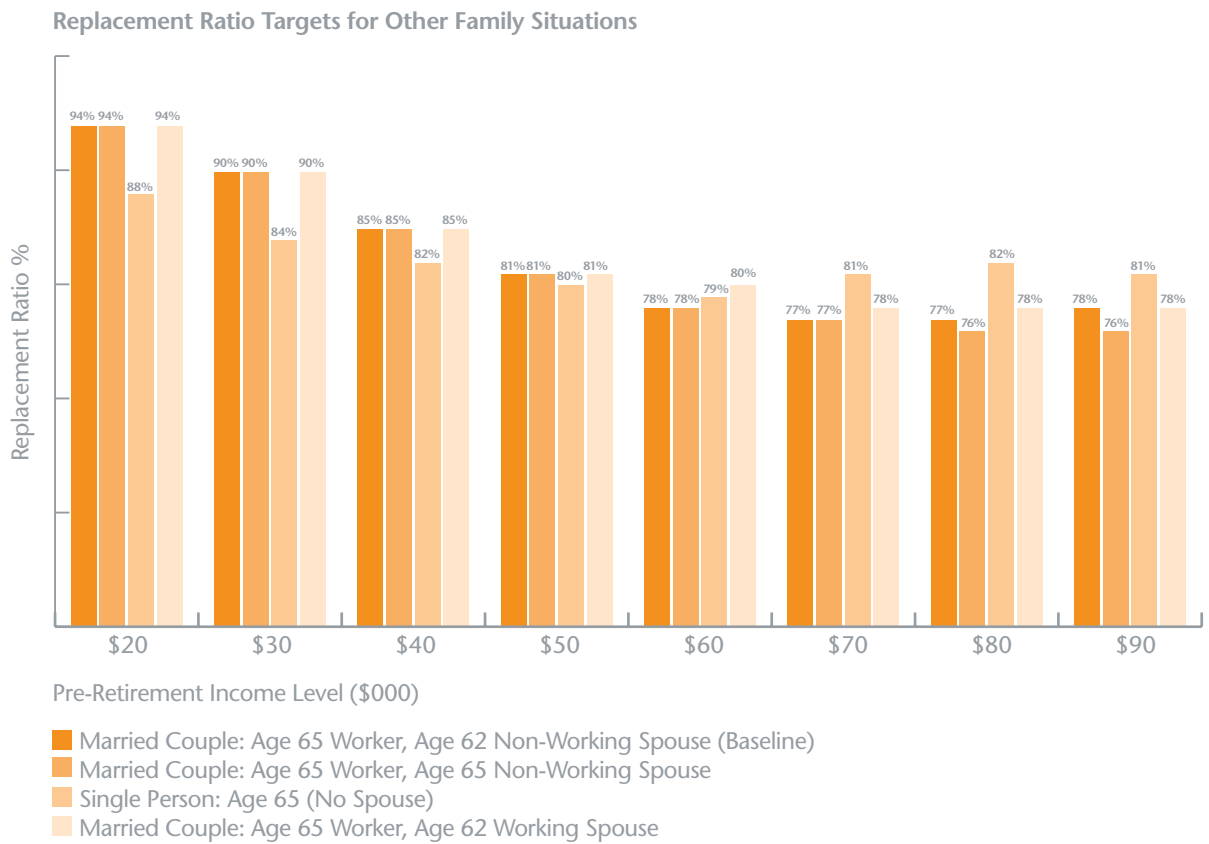
1. Income tax tables and tax exemptions that apply in different situations,
2. The amount of Social Security taxes paid (e.g., a two-worker family may pay higher aggregate Social Security taxes at a given pre-retirement income level), and
3. The amount of the couple’s aggregate Social Security benefit, which influences how much of the total retirement income is subject to tax.

**Replacement Ratio Targets for the Baseline Situation and Adjustments Required for Other Family Situations**

Pre-Retirement Income (\$000)	Baseline Couple 65/62 One Working (%)	Single Age 65 (%)	Couple 65/65 One Working (%)	Couple 65/62 Both Working (%)
20	94	88 (-6)	94 (0)	94 (0)
30	90	84 (-6)	90 (0)	90 (0)
40	85	82 (-3)	85 (0)	85 (0)
50	81	80 (-1)	81 (0)	81 (0)
60	78	79 (+1)	78 (0)	80 (+2)
70	77	81 (+4)	77 (0)	78 (+1)
80	77	82 (+5)	76 (-1)	78 (+1)
90	78	81 (+3)	76(-2)	78 (0)

## Baseline Case and Adjustments for Other Family Situations (continued)

After making the adjustments shown in the table on page 9, resulting Replacement Ratios for the baseline and three other family situations are as shown below:



## Single: Compared to Married Baseline

At the lowest income levels, pre-retirement taxes are higher for singles than for married couples. As a result, the single worker has less to spend before retirement, and therefore, has less to replace after retirement. The Replacement Ratios at lower income levels are therefore smaller than for the married family unit (baseline or others.) At higher income levels, pre-retirement taxes are also higher for singles. However, post-retirement taxes are also far greater at the higher income levels for singles. The net effect is that single people at higher income levels actually need higher Replacement Ratios than married couples. Also, at a given level of pre-retirement income, the effect of taxation of Social Security benefits is more pronounced for the single worker. The retirement income thresholds at which Social Security benefits become subject to income tax are lower for a single taxpayer. The threshold at which 50 percent of Social Security becomes taxable is \$25,000 for a single taxpayer (compared to \$32,000 for married taxpayers), and the threshold at which 85 percent becomes taxable is \$34,000 for a single taxpayer (compared to \$44,000 for married taxpayers).

## Married: One Wage Earner, Both Age 65

This section of the report also compares two other married situations to the baseline Replacement Ratios. The first is a married couple, one wage earner, both age 65. Since the age 65 spouse gets an increased standard deduction, post-retirement taxes are reduced somewhat when compared to the baseline case (where the spouse is age 62.) Also, the family Social Security benefits are 1.491 times the wage earner's primary benefit (compared to 1.375 when the spouse is age 62).

At the \$60,000 gross pre-retirement income level and below, the retirees do not pay any significant income taxes, so there is no difference in the Replacement Ratios due to taxes. The combination of the increased standard deduction and the increased family Social Security benefits makes a slight difference in the Replacement Ratios at the \$80,000 and \$90,000 income levels.

## Married: Two Wage Earners, Ages 65 and 62

Another family situation focuses on two wage earners, one age 65 and one age 62. We assumed that the primary wage earner brings in 60 percent of the family unit's income and the spouse brings in 40 percent. Results for this family situation are very similar to the baseline case.

# Replacement Ratios at Higher Income Levels

For the first time with this update, some usable Consumer Expenditure Survey (CES) data was available at income levels above \$90,000. This data is less complete than at income levels at \$90,000 and below. Using the available data, we have extended the replacement ratio calculations to income levels of \$150,000, \$200,000, and \$250,000. As with prior studies, we wanted to determine whether the replacement ratios continue to trend upward above the \$90,000 income level, the top level in the formal study.

The following table and graph show that the ratios do continue to trend upward. Although higher pre-retirement taxes paid by higher income individuals have a decreasing effect on replacement ratios, higher post-retirement taxes have an even more powerful effect and drive the ratios upward. The net effect is that higher replacement ratios are needed as income increases.

It would be difficult for high-income individuals to generate sufficient retirement income solely from Social Security and an employer’s qualified plans. These individuals generally need to receive a substantial portion of their retirement income from personal savings, a non-qualified arrangement, or both.

Baseline and Projected Higher Income Replacement Ratios



Replacement Ratios: Higher Income Levels			
Pre-Retirement Income (\$000)	Social Security (%)	Private and Employer Sources (%)	Total (%)
80	39	38	77
90	36	42	78
150	23	61	84
200	17	69	86
250	14	74	88



# Savings as a Percentage of Gross Pre-Retirement Income

Savings rates are one of the three major components (along with taxes and expenditure changes) in the Replacement Ratio equation. Higher savings rates both reduce the needed replacement percentages (employees are assumed to cease their savings plans once retired) and provide the employee with the ability to develop the needed savings accounts.

For this and each prior study, we developed savings rates using recent CES data. Savings is defined as the sum of the following:

1. Net acquisition of stocks and bonds
2. Net investment in farm or business
3. Net change in savings and checking accounts
4. Net change in money owed
5. Net change in U.S. savings bond holdings
6. Contributions to retirement plans

This definition includes an element of investment return as well as a pure savings element. Savings rates used for this study are based on actual savings rates found in the CES data for active employees age 50 – 64. These rates are shown below

**Actual Savings Rates for Active Employees Age 50 – 64**

Pre-Retirement Income (\$000)	Average Savings Rate (%)
20	1.98
30	2.79
40	3.45
50	4.05
60	4.54
70	4.91
80	5.24
90	5.57

# How to Use Replacement Ratios

For many years, replacement ratios have been used to measure retirement adequacy. Typical users include employers reviewing plan design, financial planners and employees preparing for retirement.

This report shows the replacement ratios that “average” people are expected to need at retirement to maintain their pre-retirement standard of living. These ratios are based on averages. Adjustments should be made when analyzing retirement needs of specific individuals. Some of the factors that may vary from person to person include the following.

## Individual Savings Rates

The baseline results assume people save at an “average” rate while they are working (see average savings rates on page 13.) People who save less than average will need higher replacement ratios. This is because they spend more and have a higher standard of living before they retire. Thus, they need more retirement income to maintain that standard of living. On the other hand, people who save more than average need less retirement income because they only need to support a lower standard of living.

## Changes in Individual Medical Expenses

This report’s baseline results assume that people’s medical expenses increase by an “average” amount when they retire. The average increase is generally \$1,000 – \$1,500 per year (see Appendix III for details). People whose expenses increase by more than average, such as people with employer-paid medical benefits that stop at retirement, will need higher replacement ratios. Due to the significant variations that may occur, this issue is covered in more detail in subsequent sections of this report.

### Medicare Part D

The average change in medical expenses, as measured for this report, is based on expenditure survey data prior to the establishment of Medicare Part D. To the extent that Medicare Part D decreases a person’s postretirement medical expenses, it will also decrease his or her needed replacement ratio. We estimate that this could potentially decrease the needed replacement ratios by up to 1 percent at the highest salary levels and up to 5 percent at the lowest salary levels.

## Other Expenditure Changes

Other changes in expenses that occur at retirement may also cause a person’s needed replacement ratio to be more or less than the baseline. For example, people who retire right after they finish paying for a child’s college education, or right after they finish paying off their mortgage, will generally need lower replacement ratios. Other people, such as those beginning to care for an elderly parent, may need higher replacement ratios.

With defined contribution, cash balance and other hybrid plans becoming a primary retirement source for many retirees, analysis beyond traditional replacement ratios may be needed to determine whether a person has enough money to retire. The next two sections of this report, “Replacement Ratios as Lump Sums” and “Tapping the Piggy Bank,” provide additional guidance for these situations.

# Replacement Ratios as Lump Sums

Traditionally, retirement adequacy has been measured in terms of replacement ratios. However, in situations where savings accounts (some combination of IRAs, personal savings, and balances in 401(k) or similar plans) are a person's largest source of retirement income, it is also important to define how large a lump sum is needed to provide an adequate retirement. The answer depends on a number of factors, such as:

- 1. How long will a person live after retirement?** Those who live longer after retiring need larger lump sums. People retiring at younger ages generally need more than people retiring at older ages, because they have longer remaining lifetimes. Also, females generally need more than males because they live longer. An average male retiring at age 65 lives another 18.3 years, while the average female lives another 20.5 years. Lifestyle, health, and other factors also influence one's lifespan.
- 2. How much will inflation increase a retiree's cost of living after retirement?** The higher the rate of inflation, the larger the lump sum needed.
- 3. What rate of investment return will the lump sum produce?** The higher the rate, the smaller the lump sum needed at retirement. Examples of how different rates of investment return affect the lump sum needed are shown in the table below. This table shows the lump sum amount needed at retirement to provide an income of \$100 per month for life to an average male or female retiring at age 65. While invested, the lump sum is assumed to return 4 percent, 6 percent, or 8 percent per year. In all cases, the \$100 payment is assumed to increase 3 percent per year to allow the retiree to keep up with inflation.

Lump Sum Needed at Retirement (Age 65) to Provide a \$100 Monthly Income for a Person who Lives an Average Lifetime

	Assumed Annual Rate of Investment Return After Retirement		
	4%	6%	8%
Male	\$19,509	\$16,160	\$13,669
Female	\$21,635	\$17,571	\$14,633

As you can see from the above chart, the lump sum needed at retirement is about 45 percent more if investments return only 4 percent, rather than 8 percent. Also, on average, women need about 9 percent more than men because they live longer.

Since the amount of the lump sum needed at retirement depends on so many factors, it is hard to know exactly how much to target. One approach is to target the amount that's needed to buy an annuity that will provide the desired level of retirement income. Using this approach, and annuity prices that were quoted to Aon at the time this report was being written, we can calculate the lump sum amounts needed at retirement. These amounts, expressed as a multiple of a person's salary at retirement, are shown in the table on page 16.

## Replacement Ratio as Lump Sums *(continued)*

**Lump Sum Amounts Needed at Retirement from Private and Employer Sources  
As a Multiple of Final Pay**

Pre-Retirement Income (\$000)	Baseline Replacement Ratio Needed (% of final pay)	Equivalent Lump Sum Needed (as a multiple of final pay)	
		Male	Female
20	25	4.0	4.5
30	31	5.0	5.5
40	31	5.0	5.5
50	30	4.8	5.4
60	32	5.2	5.7
70	35	5.6	6.3
80	38	6.1	6.8
90	42	6.8	7.5

The lump sum multiples shown above are in addition to income that is expected to be provided by Social Security. Employees with a defined benefit plan will have part of their post-retirement income provided through that program. Thus, they won't need as large a lump as those indicated above.

# Tapping the Piggy Bank

## Using your account balance in retirement

Unless you are covered by a traditional pension plan, you may have to rely on your savings accounts (some combination of IRAs, personal savings, and balances in 401(k) or similar plans) as your primary source of retirement income. If so, you can use the Replacement Ratios as Lump Sums section of this report as a guide to how much you should accumulate by the time you retire. Even if you accumulate the desired amount, however, there are more challenges. What do you do after retirement? How do you manage your account? How much of it should you spend each year? While the answers are not simple, two basic approaches to spending your retirement savings are described in this section:

**Approach #1: Manage Your Own Account:** Under this approach, you would keep your money invested and withdraw amounts as you need them.

**Approach #2: Buy an annuity:** Under this approach, you would buy an annuity that would provide you with a specified amount of income for the rest of your life.

Either of these two approaches could be applied to your entire account balance. In many cases, however, it may be prudent to do some of each—buy an annuity with part of your balance, and invest the rest, making periodic withdrawals from the invested portion. Many factors should be considered in making this decision. The rest of this section assumes that one approach is used exclusively. Results are then compared.

## Approach #1: Manage Your Own Account

Managing your own account offers a lot of flexibility, but there are also risks. The primary risks include:

- 1. Investment Return:** The amount you can spend in retirement depends greatly on the investment return your account earns. Every extra dollar of return gives you an extra dollar to spend. On the other hand, every dollar you lose takes away a dollar. To illustrate the variability, a person who retires at age 65 and lives an average lifetime will be able to withdraw approximately 20 percent more every year if their account earns 6 percent annually, rather than 4 percent. Unfortunately, higher yielding investments usually come with higher risks. Investments should be chosen that are appropriate for your situation.
- 2. Longevity:** Longevity refers to the age at which you die, and it's generally out of your control. If you live too long, you can outlive your savings. The following chart shows how many years you should plan to have your account last, depending on how sure you want to be that you do not outlive your assets.

Number of Years Your Retirement Account Should Last

Desired Probability That You Will Not Outlive Your Assets	Number of Years You Should Prepare For		
	Male only (65)	Female only (62)	Married Couple (Male 65, and Female 62)
50%	19	24	27
75%	24	30	31
95%	31	38	38

## Tapping the Piggy Bank *(continued)*

3. **Inflation:** Another risk is inflation. One way to protect against inflation is to plan to withdraw less from your account initially and increase that amount over time to offset inflation. The more inflation you expect, the less you should spend in your early years of retirement.
4. **Expenditure Changes:** Another factor is that it is hard to predict is how your expenditure needs (long-term care, medical, housing, travel, food, family, etc.) will change in the years after you retire. Although hard to predict, possible changes should be considered when you determine how much to withdraw each year from your account.

Several analyses done on this subject have suggested a standard “withdrawal rate” of approximately 4 percent. Under this standard, if you have \$100,000 in a savings account, you should withdraw \$4,000 in the first year. After that, you increase the withdrawal for inflation.

The 4 percent rule of thumb is a reasonable estimate for many situations. However, the right withdrawal rate for you is likely to be different. To give you an idea of reasonable withdrawal rates, we made some assumptions, including:

- **Investment Return:** We assumed your investment account would consist of a mix of 60 percent equities and 40 percent fixed income, and would produce a mean return of 7.8 percent, with a standard deviation of 10.7 percent.
- **Inflation:** We assumed you would increase your withdrawals from the account 3 percent per year to cover inflation after you retire.
- **Longevity:** We assumed that standard 2008 mortality rates would apply to you.
- **Conservatism:** We assumed you would want no more than a 5 percent chance that your account would run out before you die.
- **Expenditures for a Couple:** For the “basecase couple,” we assumed the annual withdrawal amount would decrease by 25 percent upon the couple’s first death. For example, assume a couple is spending \$10,000 per year while both members are alive. When the first person in the couple dies, we assume the other person will need to spend only \$7,500 per year (adjusted over time for inflation) for the rest of his or her lifetime.

Based on these assumptions, the following withdrawal rates are calculated:

**Projected Withdrawal Rates with an Expected Annual Rate of Return of 7.8 percent**

Age	Percentage of an account that can be withdrawn and still have a 95 percent chance of not running out of money for your lifetime (%)		
	Base Case Couple *	Male Only	Female Only
55	3.5	3.7	3.5
60	3.8	4.1	3.8
65	4.3	4.6	4.2
70	4.8	5.1	4.7
75	5.7	6.2	5.6
80	6.6	7.6	6.6
85	8.1	9.3	8.1

\* The basecase couple is a male at the age shown and a female three years younger. The annual withdrawal amount is assumed to decrease 25% when the first person in the couple dies.

The withdrawal rates would be different if your expected return (after any fund expenses) is different than the assumed annual rate of 7.8 percent. The effect of a ½ percent reduction is shown in the following table:

**Comparison of Projected Withdrawal Rates with Annual Rate of Return at 7.8 percent and 7.3 percent**

Age	Percentage of an account that can be withdrawn and still have a 95 percent chance of not running out of money for your lifetime (%)		
	Male with an Average Return of 7.8%	Male with an Average Return of 7.3%	Change
55	3.7	3.5	-0.2
65	4.6	4.4	-0.2
75	6.2	6.1	-0.1

If you manage your own account, there’s a tradeoff between the amount you can withdraw and the chance that you’ll run out of money. The preceding calculations assume you want only a 5 percent chance of running out of money. This is fairly small, and you don’t have to be that conservative. If a 65-year old male can accept a 25 percent chance of running out of money (instead of just 5 percent), he could increase his initial withdrawal rate from 4.6 percent all the way up to 6.6 percent. If he can accept a 50 percent chance, his initial withdrawal rate would be 8.6 percent.

## Approach #2: Buy an Annuity

It is possible to avoid the risks of investment return and longevity, and reduce the risk of inflation, by purchasing an inflation protected annuity. Annuity buyers need to shop carefully, however, because the price of annuities can vary significantly among insurance companies. Based on annuity prices quoted to Aon at the time this report was being written, the initial withdrawal rate you might expect from an annuity product that provides a payment that increases 3 percent per year over its lifetime is shown below. The withdrawal rates are for illustration purposes only. Actual withdrawal rates and annuity prices vary from carrier to carrier, and from day to day, based on economic and other factors.

Initial Withdrawal Rate Expected for Annuity With 3 percent Increase per Year		
Age	Male Only	Female Only
65	6.2%	5.6%
70	7.5%	6.6%

## Comparing the Approaches

It would seem that buying an inflation protected annuity would be the obvious choice. You are protected against outliving your money (and 100 percent certain, rather than 95 percent!), and you get a larger initial payment. For example, a male age 65 with \$300,000 in his savings accounts could get the following choices.

Initial Withdrawal Amounts for a Male Age 65		
Approach	Initial Withdrawal	
	As % of the Account	\$Amount
Manage your own account with a 95% chance of not running out of money	4.6%	\$13,800
Buy an annuity	6.2%	\$18,600

**Why then would you want to manage your own account?** There are two major advantages. First, when you manage your own account, whatever is left when you die can go to your heirs. This can be a significant death benefit. Since the 4.6 percent withdrawal rate was calculated to give you a 95 percent chance of never running out of money, it also means that something will be left in your account when you die, 95 percent of the time. In the above example (a 65-year old male who retires with a \$300,000 account and who withdraws \$13,800 per year, adjusted for inflation), the average amount left at your death would be almost \$600,000. The advantages of providing your heirs with this death benefit should be weighed against the increased income you could receive from an annuity (the annuity in our example is assumed to provide no death benefit.) Of course, the exact amount that might be left in your account when you die depends on when you die, past fund returns, and other factors.



Second, you can periodically adjust your withdrawal rate based on a review of your account balance. Many times, this will mean an increase. For example, take a male age 65 with an account balance of \$300,000. He takes out \$13,800 (4.6 percent) in the first year. Five years later he is withdrawing \$15,998 per year (assuming inflation is 3 percent per year). If his account balance has grown to \$320,000 due to investment returns greater than his withdrawal, he could adjust his withdrawals up to \$16,320 (5.1 percent of the \$320,000).

## In the Final Analysis

**So, what should you do?** Manage your own account or buy an annuity? It depends. The following charts summarize the advantages and disadvantages for a person retiring at age 65.

Pros and Cons: Managing Your Own Money			
	Base Case Couple	Male age 65	Female age 62
Initial Withdraw Rate to achieve a 95% chance of not running out of money	4.3%	4.6%	4.2%
Advantages	<ul style="list-style-type: none"> <li>You have immediate access to the money.</li> <li>You can withdraw more if the funds do better than expected.</li> <li>Your heirs will have a death benefit when you die.</li> <li>You can buy an annuity at some point in the future.</li> </ul>		
Disadvantages	<ul style="list-style-type: none"> <li>There is lesser initial income than the annuity option.</li> <li>You bear the risk of poor investment performance.</li> <li>You could outlive your account.</li> <li>You have to manage the money.</li> </ul>		

Pros and Cons: Buying an Annuity		
	Male age 65	Female age 62
Annuity Payment	6.2%	5.6%
Advantages	<ul style="list-style-type: none"> <li>You have higher initial income.</li> <li>You cannot outlive the income.</li> <li>You have no investment risk or decisions to make.</li> </ul>	
Disadvantages	<ul style="list-style-type: none"> <li>You lose flexibility over the timing of withdrawals.</li> <li>You lose the possibility of much greater asset returns.</li> <li>There is no death benefit (unless specified in the annuity).</li> <li>You are locked in to one insurance company.</li> </ul>	

**The best answer may be to do some of both.** Invest part of the money for long term returns and death benefit protection, and buy an annuity with the rest to hedge against the investment return and longevity risks.

# Effect of Medical Benefits on Replacement Ratios

Fewer and fewer employers are sponsoring post-retirement medical programs. Thus, many employees have either lost their post-retirement medical benefits completely, or had significant costs shifted to them. The baseline replacement ratios provided in this report are based on averages according to CES data. According to these averages, the typical employee spends more on health care after retiring than before. However, situations and medical costs can vary widely from person to person. Therefore, individuals should consider their own situation and adjust the replacement ratios as appropriate.

To estimate the extent to which required replacement ratios may vary, we analyzed three possible scenarios:

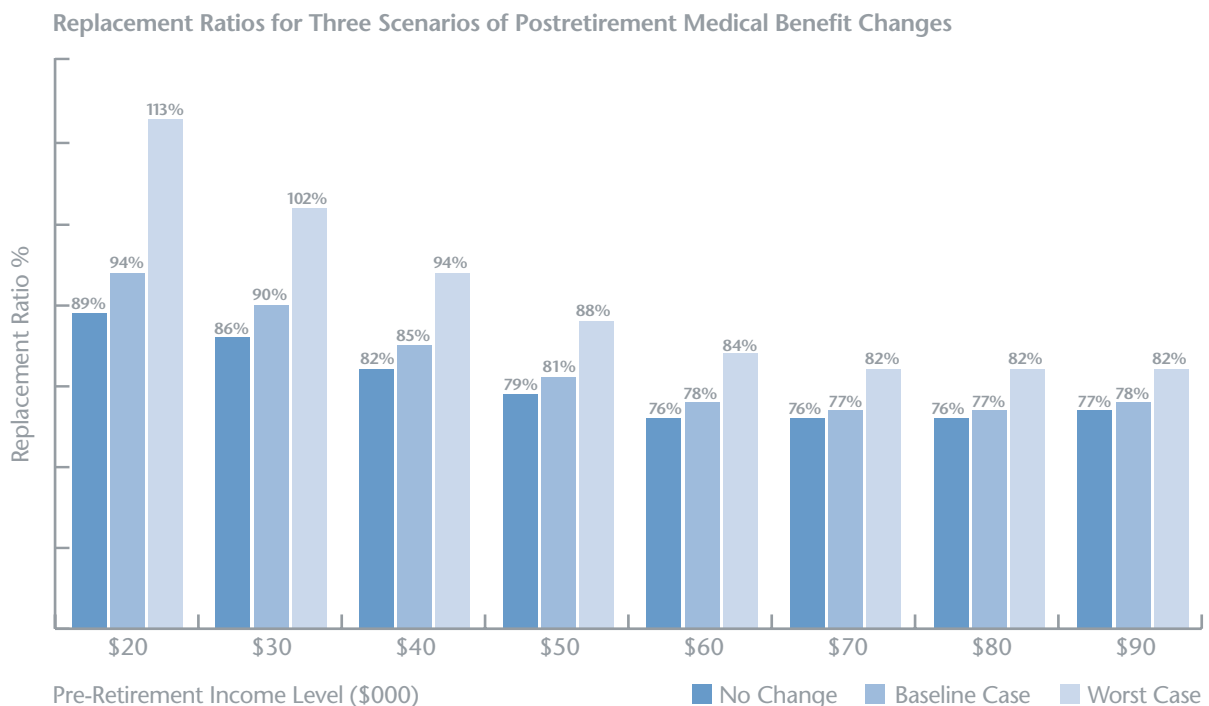
**1. No Change:** The first scenario is close to a “best case.” It’s not absolutely the best possible case, but it is close. Under this scenario, the employee is assumed

to incur no change in his or her medical costs at retirement. It’s called the “No Change” scenario.

**2. Baseline:** The second scenario is the baseline case described on page 2. It’s called the “Baseline Case.” Under this scenario, the employee’s medical expenditures are assumed to increase at retirement by the amounts shown in Appendix III.

**3. Worst Case:** The third scenario assumes the employee’s medical costs increase significantly at retirement. Under this scenario, medical costs are assumed to increase by \$400 per month when the employee retires. This represents the combined cost of Medicare Parts B and D premiums, and a premium for supplemental coverage.

Replacement ratio results for the three scenarios are shown below.



As shown above, the level of medical benefits provided before and after retirement can have a significant effect on post-retirement income needs. Most employees will be somewhere between the “no change” and “worst case” scenarios.

# Accumulating Wealth

## When should you start saving for retirement?

**The sooner, the better!** Compound interest works wonders. Saving at age 20 provides twice as much benefit as saving at age 30. Saving at age 30 provides twice as much benefit as saving at age 40. You can say the same about any two ages that are ten years apart. So, whatever age you are, the best time to save is now.

The following charts show how much needs to be saved annually, as a percentage of salary, to achieve the replacements ratios recommended in this report. Calculations assume a person starts saving at age 25, 35, 45, or 55. All the projections assume you retire at age 65, and that full Social Security benefits will be available. The salary shown is the current salary, and it is assumed to increase 3 percent per year until retirement. Finally, we assumed a 7 percent rate of return on savings.

Yearly Savings as a Percentage of Pay for Males

Current Salary (\$000)	Goal as a multiple of pay at retirement	% of pay that needs to be saved each year until age 65, if saving starts at age x			
		25	35	45	55
20	3.1	3.5	5.8	10.9	26.7
30	3.8	4.2	7.1	13.3	32.8
40	3.8	4.2	7.1	13.3	32.8
50	3.7	4.1	6.9	13.0	31.9
60	4.0	4.5	7.5	14.0	34.5
70	4.3	4.8	8.1	15.1	37.1
80	4.7	5.2	8.8	16.5	40.5
90	5.2	5.8	9.7	18.2	44.9

Yearly Savings as a Percentage of Pay for Females

Current Salary (\$000)	Goal as a multiple of pay at retirement	% of pay that needs to be saved each year until age 65, if saving starts at age x			
		25	35	45	55
20	3.3	3.7	6.2	11.6	28.5
30	4.1	4.6	7.7	14.4	35.4
40	4.1	4.6	7.7	14.4	35.4
50	4.0	4.5	7.5	14.0	34.5
60	4.3	4.8	8.1	15.1	37.1
70	4.7	5.2	8.8	16.5	40.5
80	5.1	5.7	9.5	17.9	44.0
90	5.6	6.2	10.5	19.6	48.3

# Conclusion

This 2008 edition of the **Replacement Ratio Study**<sup>™</sup> reveals an increase in the amount of income people need at retirement to maintain their standard of living. Required replacement ratios now range from 77 percent for a person earning \$80,000 to 94 percent for a person earning \$20,000. These ratios are slightly higher than those that were calculated in the 2004 update, and significantly higher than those shown in the original 1980 President's Commission report. Thus, existing "rules of thumb" that are based on prior studies should be updated as appropriate.

Although the trend of increasing replacement ratios began a decade ago, most of the increases found in this update are generally small. The only increases of more than 1 percent are for people earning \$60,000 or less per year. The greatest increase is for people with the lowest levels of pre-retirement income. Unfortunately, this is the group that may have the hardest time planning and providing for their own retirement.

Three factors make retirement planning more important than ever before. First, the baby boomers are approaching retirement. How well this cohort manages the transition will affect not only the personal well-being of a large cohort of U.S. workers, but will also influence public policy and the corporate workforce of tomorrow. Second, the trend away from employer-sponsored defined benefit and postretirement medical plans puts more responsibility on individual workers to actively plan and provide for their own retirement. Third, the amount of income required for a person to maintain their standard of living after retiring is at an all-time high. The luxury of being able to get by on significantly less income than a person was earning before retirement may now just be part of the "good old days."

To help meet the challenge, this study provides employees and plan sponsors with the information needed to begin planning for retirement effectively. It's a journey that can have a happy ending.

# Appendix I

## Determining Replacement Ratios

The data in the U.S. Department of Labor’s Bureau of Labor Statistics’ Consumer Expenditure Survey (CES) allows us to quantify key items in the Replacement Ratio formulas shown here.

The first formula (expenditure, tax, and savings model) takes into account changes in age- and work-related expenditures after retirement, in addition to taking into account savings patterns and changes in taxes after retirement. The second formula (tax and savings model) disregards changes in age- and work-related expenditures, and the third formula (tax only model) disregards both savings and changes in age- and work-related expenditures. The symbols used in the formulas are defined as follows:

PrRPG:	Gross pre-retirement income
PrRT:	Pre-retirement taxes
PrRS:	Pre-retirement savings
NCCR:	Change in age- and work-related expenditures
PoRT:	Post-retirement taxes

### The “Expenditure, Tax, and Savings” Model:

Replacement Ratio = f(Taxes, Savings, Expenditure Changes)

$$RR = \frac{PrRPG - PrRT - PrRS \pm NCCR + PoRT}{PrRPG}$$

### The “Tax and Savings” Model:

Replacement Ratio = f(Taxes, Savings)

$$RR = \frac{PrRPG - PrRT - PrRS + PoRT}{PrRPG}$$

### The “Tax Only” Model:

Replacement Ratio = f(Taxes)

$$RR = \frac{PrRPG - PrRT + PoRT}{PrRPG}$$

Replacement Ratio Example			
PrRPG	=	Gross pre-retirement income	\$60,000
PrRT	-	Pre-retirement taxes	10,967
PrRS	-	Pre-retirement savings	2,225
NCCR	±	Change in expenditures at retirement	115
PoRT	+	Post-retirement taxes	49
	=	Retirement income needed	\$46,972
PrRPG	÷	Gross pre-retirement income	\$60,000
		Replacement Ratio	78%

The development of the replacement ratios for each gross pre-retirement income level is shown in Appendix II.

# Appendix II

## Results of 2008 Retirement Income Replacement Ratio Study—Baseline Case

2008 Baseline Case Results								
Married Couple (One Wage Earner); Age 65 Worker, Age 62 Spouse								
	2008 Pre-Retirement Income Level							
	\$20,000	\$30,000	\$40,000	\$50,000	\$60,000	\$70,000	\$80,000	\$90,000
1. Gross Pre-Retirement Income	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
2. Pre-Retirement Taxes								
a. Social Security	1,530	2,295	3,060	3,825	4,590	5,355	6,120	6,885
b. Federal Income	191	1,166	2,397	3,839	5,277	6,713	8,151	10,017
c. State Income	40	243	500	800	1,100	1,399	1,699	2,087
d. Total Pre-Retirement Taxes [a + b + c]	1,761	3,704	5,957	8,464	10,967	13,467	15,970	18,989
3. Disposable Income After Taxes [1 - 2d]	18,239	26,296	34,043	41,536	49,033	56,533	64,030	71,011
4. Pre-Retirement Savings								
a. As a % of Disposable Income	1.98%	2.79%	3.45%	4.05%	4.54%	4.91%	5.24%	5.57%
b. Amount Saved [3 x 4a]	362	733	1,174	1,684	2,225	2,774	3,354	3,958
5. Pre-Retirement Spendable Income [3 - 4b]	17,877	25,563	32,869	39,852	46,808	53,759	60,676	67,053
6. Expenditure Changes at Retirement	1,020	1,385	1,228	749	115	(593)	(1,298)	(1,886)
7. Required Post-Retirement Spendable Income [5+6]	18,897	26,948	34,097	40,601	46,923	53,166	59,378	65,167
8. Postretirement Taxes								
a. Federal Income	0	0	0	0	41	910	2,097	3,995
b. State Income	0	0	0	0	8	167	369	674
c. Total Post-Retirement Taxes [a + b]	0	0	0	0	49	1,077	2,466	4,669
9. Required Gross Post-Tax Retirement Income [7+8c]	18,897	26,948	34,097	40,601	46,972	54,243	61,844	69,836
10. Required Replacement Ratio [9 / 1]	94%	90%	85%	81%	78%	77%	77%	78%
11. Estimated Social Security Benefit	13,827	17,655	21,467	25,295	27,869	29,568	31,053	32,472
12. Social Security Replacement Ratio [11 / 1]	69%	59%	54%	51%	46%	42%	39%	36%
13. Required Repl Ratio from Other Sources [10 - 12]	25%	31%	31%	30%	32%	35%	38%	42%

# Appendix III

## Expenditure Changes

2008 Analysis of Expenditure Changes at Retirement								
Expenditure Category	Expected Expenditure for a 2008 Pre-Retirement Income Level of:							
	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
<b>1. Reading And Education</b>								
a. Working	249	341	425	506	591	685	790	900
b. Retired	219	289	354	415	477	539	602	661
c. Increase (Decrease) [(b) - (a)]	(30)	(52)	(71)	(91)	(114)	(146)	(188)	(239)
<b>2. Health Care</b>								
a. Working	1,549	1,824	2,044	2,226	2,390	2,546	2,692	2,819
b. Retired	2,482	2,915	3,202	3,374	3,476	3,538	3,580	3,620
c. Increase (Decrease) [(b) - (a)]	933	1,091	1,158	1,148	1,086	992	888	801
<b>3. Utilities</b>								
a. Working	2,275	2,555	2,779	2,960	3,130	3,297	3,451	3,578
b. Retired	2,436	2,783	3,052	3,259	3,414	3,510	3,526	3,451
c. Increase (Decrease) [(b) - (a)]	161	228	273	299	284	213	75	(127)
<b>4. Household Operations</b>								
a. Working	213	277	335	392	452	514	583	656
b. Retired	340	435	517	590	661	732	804	873
c. Increase (Decrease) [(b) - (a)]	127	158	182	198	209	218	221	217
<b>5. Shelter</b>								
a. Working	5,942	7,090	8,107	9,018	9,885	10,726	11,526	12,238
b. Retired	5,137	6,071	6,848	7,533	8,219	8,948	9,717	10,471
c. Increase (Decrease) [(b) - (a)]	(805)	(1,019)	(1,259)	(1,485)	(1,666)	(1,778)	(1,809)	(1,767)
<b>6. Entertainment</b>								
a. Working	1,046	1,301	1,525	1,723	1,909	2,085	2,252	2,399
b. Retired	1,297	1,655	1,954	2,204	2,412	2,571	2,679	2,729
c. Increase (Decrease) [(b) - (a)]	251	354	429	481	503	486	427	330
<b>7. Food</b>								
a. Working	3,715	4,201	4,617	4,980	5,328	5,678	6,015	6,316
b. Retired	4,041	4,814	5,350	5,710	5,971	6,166	6,290	6,343
c. Increase (Decrease) [(b) - (a)]	326	613	733	730	643	488	275	27
<b>8. Apparel and Services</b>								
a. Working	631	787	928	1,058	1,182	1,304	1,422	1,531
b. Retired	589	758	897	1,013	1,122	1,227	1,330	1,429
c. Increase (Decrease) [(b) - (a)]	(42)	(29)	(31)	(45)	(60)	(77)	(92)	(102)
<b>9. Transportation</b>								
a. Working	4,896	6,223	7,383	8,413	9,386	10,310	11,187	11,963
b. Retired	4,995	6,264	7,197	7,927	8,616	9,321	10,092	10,937
c. Increase (Decrease) [(b) - (a)]	99	41	(186)	(486)	(770)	(989)	(1,095)	(1,026)
<b>10. Total Increase (Decrease) in Age- and Work-Related Expenses</b>								
	1,020	1,385	1,228	749	115	(593)	(1,298)	(1,886)

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