RSP User's Manual

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RSP 3 - The Retirement Spending Planner
Version 3.22
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Part I – Introduction

RSP is a tool for retirement planning. It is intended for professional advisors, but can be used by individuals planning their own retirement as well.

The focus is to enable a user to estimate whether a savings plan combined with a current portfolio are sufficient to sustain desired spending levels during retirement. RSP addresses the *uncertainty* in a plan by running Monte Carlo simulations of portfolio performance. Information is entered as to current portfolio amounts and types of investment, how much more income is expected before retirement, what other benefits are expected during retirement, a description of tax liabilities, and what spending levels are desired. Cash flows for the time period of interest are run, with random returns on the investments, and final wealth is noted. Then the cash flows are rerun thousands of times, and the resulting distribution of final wealth is plotted in various ways. The latter reveal the probability that a financial objective, expressed in dollars at some target age, is achieved.

The program can be used to devise a plan for when retirement is possible, with the level of spending that is desired. It is also intended to address the case of someone who is already retired, to check that current spending levels are prudent and sustainable. Certain inflexible inputs can be held fixed while others are varied throughout a range of options to find fixes for plans that fall short of the objective. Some of those variations can be done in automated fashion.

It is important to realize that such plans must be reviewed regularly, preferably on an annual basis. An unexpectedly bad year may cause the user to be in an entirely different situation where reductions in spending have to be considered. Basic changes in the economic landscape may cause professional market analysts to advise new guidelines for assumptions about volatilities that accompany specific returns. The user may experience fundamental changes in his personal situation, with new responsibilities, a change in marital status, or a sale of some assets for much less than estimated in the planning. A prudent individual will review everything, every year, even if there is no big change in the situation. The program makes it easy for the advisor to do that. (Some folks take prudence beyond that and want more frequent reviews. That should be resisted.)

Before launching into use of the program we make some cautionary remarks. The most crucial unknowns that the wealth manager will have to enter are the gross returns and volatilities of their client's investment portfolios, although we now supply some carefully chosen default values for certain specific asset classes. Also, in looking at results, you should tend to want rather high assurance that the plan will work. If there is a 75% chance of your client being solvent at age 85, and he thinks he will live to that age, that is not high enough assurance. If there is a 75% chance of being solvent, then there is a 25% chance of being broke! And if he's sure he'll live to be 85, then he has a fair chance to live to be 90.

Experience in running the program has evolved two basic rules of thumb.

* For someone who has just retired or is near retirement and expects to live another 25-30 years you should look for a plan which has 85-90% success probability.

* For someone younger than that, the planning period is longer, but the final result should have the same kind of 85-90% success probability. But, you should then focus on an intermediate stage, say the year of planned retirement, and a wealth level at that age which is consistent with the long term plan.

Of course, higher than 90% confidence is even better. With experience running the program you will see that many clients cannot afford 95% confidence. The way to achieve very high confidence may require drastic reduction in expectations of what they can spend, or working many years past the point when they had hoped to retire. This is the major eye-opener we are all experiencing when risks are faced realistically, as opposed to the former myopic view which assumed the expected return would occur each and every year.

There is more to say on this subject and additional material will appear from time to time at our website (http://mathfinance.wagner.com/).

1. System Requirements and General Advice

The program requires a PC with a recent version of Microsoft Windows (95 or later), and runs under Microsoft Excel 8, 9, 10, 11, or 12 as included in Microsoft Office 97, 2000, XP, 2003, or 2007. Most of the functional capability of Excel is available, and needed for entering inputs, editing data, and sizing windows for viewing and printing. You also can customize by adding your own charts and worksheets. The program will be used most efficiently by someone who is experienced with spreadsheets in general, and Excel in particular. If you're not, you'll need to learn the basics about Excel: how to enter numbers in a cell, use of scroll bars, and the File menu. The scroll bars can be used to navigate within a sheet and the <<, >>, or the tabs to get from sheet to sheet within a workbook. Depending on your screen size, you may have to use View→Zoom on some sheets to view them more conveniently. To print your results, highlight the cells you want to print, select File→Print Area→Set Print Area, then File→Print. Most customizations will require you to use Tools→Protection→Unprotect Sheet to unlock the sheet being modified. There is no need to re-lock the sheet, as the software automatically re-locks sheets at key points in the processing.

Warning: Never Protect the Workbook or use a password to Protect a Sheet. That will prevent the software from manipulating the sheets.

Warning: Do not Cut anything on RSP's sheets. That may cause other cells to be misaligned. Instead, Copy and Paste Special onto a fresh sheet to create harmless copies that may be transformed arbitrarily.

2. What's Available in RSP

1. Each portfolio account can use up to 11 asset classes, with one standard set of default returns, volatilities, and correlations provided.
2. Multiple tax-exempt asset classes (municipal bonds and bond funds).
3. User may define ten standard portfolio allocations using the 11 asset classes, typically progressing from most aggressive to most conservative.
4. Provision to redefine and store customized asset class schemes.
5. Social Security and Medicare FICA taxes calculated.
6. Ability to itemize federal deductions, with state and local taxes added for each rep.
7. Ability to create graduated state tax tables.
8. Ability to disable taxes without modifying the tax tables.
9. Save-only pre-retirement mode, as an option.
10. Required minimum distributions (RMDs) are calculated automatically, with the ability to override the default schedule.
11. Client data can be saved in separate Excel workbooks, making it easier to send problem cases to us, and to share cases with colleagues.
12. Mechanism that simplifies annual updates of your client cases.
13. Ability to run small number of reps, with a convention that 0 replications will use zero volatility.
14. Graduated advisor management fee.
15. Extended re-balancing model – separate for Taxed vs. Tax-deferred, complex balancing involving the 11 asset classes.
16. Provision for tax-exempt income category.
17. Concise summary report.
18. Sensitivity tests that compare portfolio allocations, spending plans, or unexpected market return scenarios (Black Swan events).
19. Ability to convert IRA accounts to Roth IRA accounts.
20. Analyses can be run over a 75-year time window, for clients aged 0 to 125.

3. Working with Client Case Files

The Client Cases button on the ClientBasics sheet accesses our filing system. This sheet automatically is displayed when you open RSP, and you can return to it at any time by clicking the Home button. Clicking the Client Cases button presents you with the following choices:

New Case	creates a new Client Case File, using the input data from the Default Client Case File as a template;
Open Case	loads an existing Client Case File into RSP;
Delete Case	removes an existing Client Case File from RSP's database;
Save Case	saves the inputs currently displayed in RSP, replacing the data in the *current* Client Case File;
Save Case As	saves the inputs currently displayed in RSP, replacing the data in a *new* or *different* Client Case File;
Save As Default	saves the inputs currently displayed in RSP, replacing the data in the *Default* Client Case File, thus creating a template to be used to create *New* cases.

After installing RSP, you should begin by setting input values that you intend to use for all or most of your clients, then doing a *Save As Default.* When using RSP for a given client for the first time, use *New Case* to create the first case for that client, and use *Save Case* after you have entered the data for his baseline case. For subsequent variations for that client, it is most efficient to open that client's baseline case and do a *Save Case As* after getting down most of the client information, so that you don't waste time with extra saves. However, some users like the discipline of doing the *Save Case As* at the top, so that they don't forget. The program comes loaded with a sensible sample case that you can refer to as you read the manual.

Each case you create with RSP is labeled with Client Name and Client Case. For a given client you may save several Client Cases under that Client Name, representing different scenarios you have worked up to show the client, or analyses from previous years that you want to preserve. Older versions of RSP had a limit of 250 cases per workbook; there is now (for all practical purposes) no limit.

The client cases are stored in separate files in the *Cases* sub-folder. They must be named according to the following convention: *RSP3#ClientName#ClientCase.xls*, where *ClientName* and *ClientCase* are specific to the client and case. If a colleague sends you one of these files, just put it in your *Cases* sub-folder and you may begin working with it in your copy of RSP. After you finish working with that case, *Save* it and give the file back to your colleague. These files also can be e-mailed to our Technical Support staff (RSPsupport@pa.wagner.com) to assist in trouble-shooting problems and general questions.

Warning: Be very careful when sharing RSP Client Case Files. The onus is upon you and your colleagues to coordinate the saving of changes to shared files.

If you want to save a case you *must* do an RSP *Save Case*. If you want the last case you worked on to be visible the next time you open RSP, you also must do an Excel Save before closing RSP.[1] However, the Excel Save is not necessary,

4. Working with Account Performance Files

The Account Management button on the AccountPerformance sheet accesses the filing system for Account Performance Files. These files contain market profile data that describes the performance of the asset classes it contains. Clicking the Account Management button presents you with the following file management choices:

Open	load an existing Account Performance File into RSP;
Save	saves the market profile inputs currently displayed in RSP, replacing the data in the *current* Account Performance File;
Save As	saves the market profile inputs currently displayed in RSP, replacing the data in a *new* or *different* Account Performance File;
Save as Default	saves the market profile inputs currently displayed in RSP, replacing the data in the *Default* Account Performance File;
Delete	removes an existing Account Performance File from RSP's database.

After installing RSP, you should begin by creating one or more market profiles that you intend to use for all or most of your clients, saving them via *Save As Default*. The program comes loaded with sensible market profiles that can be used by those who do not have access to more detailed performance data.

The Account Performance Files are stored in separate files in the *Accounts* sub-folder. They have no naming convention, although large firms may wish to impose one. If a colleague sends you one of these files, just put it in your *Accounts* sub-folder and you may begin working with it in your copy of RSP. If you make changes to the account performance data, *Save* it and give the file back to your colleague. These files also can be e-mailed to our Technical Support staff (RSPsupport@pa.wagner.com) to assist in trouble-shooting problems and general questions.

Warning: Be very careful when sharing RSP Account Performance Files. The onus is upon you and your colleagues to coordinate the saving of changes to shared files.

The only way that your market profile data will be saved in an Account Performance File is via the *Save* or *Save As* buttons on the Account Management dialog. An Excel Save will not save these files, nor will an RSP Save Case. A Save Case will save the market

[1] If you do an Excel Save without having done an RSP *Save Case*, the entries on that sheet will appear when you reopen RSP, but the Client Case File will not match what you see on the screen.

profile data to the Client Case File, but not to the Account Performance File. This allows you to customize this data for each client, without changing your official data.

After saving an Account Performance File, you must remember to load the revised market profile data into any client case that uses that file. For each of these cases, you must use Client Cases→Open Case to load the case, then Account Management→Open to load the revised market profile data, then Client Cases→Save Case to save the case with the revised data.

5. Technical Support

The answers to many questions that users have regarding the use of RSP, and the solutions to some typical problems that occur, can often be found in either the user's manual or our RSP FAQ page:

http://mathfinance.wagner.com/PRODUCTS/RETIREMENT/RSP/rspfaq.html

Users should consult these resources before contacting technical support. If a satisfactory answer is not found there, then contact technical support. The very best way to get a prompt response to a technical issue is to send a detailed question or description of your problem to RSPsupport@pa.wagner.com. Be sure to include the version of Windows and Excel you are using, and describe the conditions under which the problem occurs. It would also be helpful to describe any recent maintenance performed on your computer, especially any which occurred subsequent to the most recent successful use of RSP. Finally, attach the Client Case File that you were using to help us determine if there is an error in your input data.

If none of the above resources are satisfactory, then call 610-644-3400 and ask for RSP 3 Technical Support. The next available RSP 3 support technician will take your call. If none are available, leave a detailed message so that the appropriate person may be assigned to your call.

The remainder of the user's manual has three major sections: a detailed page by page description of everything in the program, descriptions of the contents of hidden sheets and what they do for you, and some appendices to discuss technical details.

Part II – The Visible Sheets

1. Client Basics

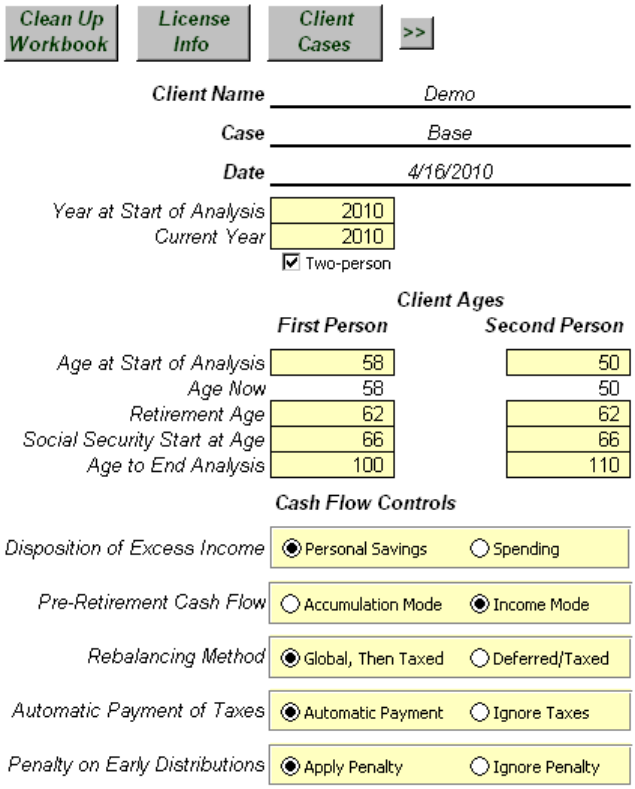
The Clean Up Workbook button is used in a case where an unexpected Excel error has appeared because you have gotten into some trouble! If this occurs, click End on the

Excel error message, then use the tabs to return to the Client Basics sheet. Clicking Clean Up Workbook will re-initialize the memory used by RSP's Excel add-in, without changing any of your input data.

The Client Cases button accesses our client case filing system, as described above. It allows you to Open existing cases, Save your work, do a Save Case As to save a case built off an existing case, and to create a New Case derived from the current default case. This button also allows you to do a Save As Default, after you have created a template to be used to create new cases. You can do your Saving at any time by returning to this sheet via the Home button, or by responding to prompts that appear as you leave certain other pages.

We will mention here the important subject of **navigation among the sheets**. When starting to enter a case you navigate to subsequent sheets by using the >> button in the upper left corner. Navigating in that fashion ports entries, and in some cases an entire schedule based on a single entry, to later sheets. Some entries in such schedules will need to be edited, and after so doing when you move among sheets you should navigate by clicking on tabs along the bottom to preserve those edits.

RSP allows you to update an old case by typing in the current year. That preserves many of the inputs that are not going to change and saves typing.



Uncheck the Two-person toggle for one-person cases, or two-person cases where the income, saving, and spending assumptions can conveniently be combined. Checking the Two-person toggle replicates many of the entry fields on later sheets, for the second person. In any case, use the Two-person option if the age difference for a married couple is more than ten years, so that Required Minimum Distributions are calculated correctly. (See the section on Detailed Inputs for more discussion of Required Minimum Distributions.)

Age to End Analysis usually is set to some advanced age beyond which the client is unlikely to live – perhaps life expectancy plus five years. Alternatively it might represent a stage in a planning process, like retirement age for a young couple.

The Cash Flow options are important to understand. In a Monte Carlo program total income and therefore taxes are not known, because the Taxed portfolio will generate random taxable dividends and distributions. Thus the equation

$$\text{Income} = \text{Spending} + \text{Savings} + \text{Taxes}$$

is somewhat indeterminate. This is why we provide the Disposition of Excess Income toggle. If you select the Savings radio button excess funds will be deposited in the Taxed Portfolio. If you select the Spending radio button then we assume any excess will be spent.

The program has logic to handle shortfalls. The priorities, in order, are: taxes, savings to tax-deferred accounts, spending, and finally personal savings to the taxed account. **Taxes are paid and spending is achieved as input even if income is not sufficient to cover them,** by drawing from the client's taxed account, or, if necessary, from the tax-deferred accounts.[2]

Many advisors prefer to treat pre-retirement savings in a simpler less explicit fashion – by specifying the amounts saved into each account, each year, without accounting for income, spending, and taxes. Their approach is to work out a savings plan as part of a side analysis, enter the agreed upon savings schedule in RSP, and dispense with the other entries. Select Accumulation Mode if that is what you wish to do. Otherwise select Income Mode. The entries requested on the next sheet will depend on that choice – more of them are needed for the more detailed Income mode.

It is worth emphasizing, if you select Income Mode, the savings amounts entered have to come out of income. Savings to the 401-K, IRA, Non-Deductible IRA, and Roth IRA will be reduced if the income entered is not sufficient. Tax-deferred savings will occur, taxes will be paid, spending as entered will occur, and whatever is left is available for the personal savings to the taxed account as planned.

[2] An exception: if the Withdrawal Cap option is active, spending may be reduced from the planned. More on that option is in a later section.

Accumulation Mode Note: You can enter miscellaneous pre-retirement expenses on any of the detailed schedules and those amounts *will* be withdrawn from the portfolio.

The Rebalancing Method button allows you to choose between two rebalancing methods: the Global/Taxed scheme and the Deferred/Taxed scheme. These schemes are described in detail in the Rebalancing Plan section.

The Automatic Payment of Taxes button gives you the option to turn off our tax model. This may be desired if you are doing a test calculation. In the past one had to enter the hidden Tax Table sheet and set the rates to zero, and then remember to change them back after completing the test.[3]

The Penalty on Early Distributions button allows you to disable the automatic IRS penalty on tax-deferred distributions occurring before age 59-½. This should be used when your client is making substantially equal periodic distributions from their tax-deferred portfolio under IRS Section 72(t).

You will notice that we do not treat age at death as part of the Monte Carlo. Many programs do this. Just as portfolio returns are subject to random variations, we could incorporate a model for death, using actuarial tables. The reason we do not is that we believe it to be bad financial planning. If you include consideration that a 55-year-old client may die next year, then spending all his money in year 1 would be acceptable. Averaged over all the scenarios in the Monte Carlo this will then result in higher spending than is desirable if he happens to live to be 85. We feel it is prudent to have a plan that is consistent with the scenarios where the clients live longer than expected.[4]

2. Client Cash Flows

Here we enter essential information about income expectations, savings, and spending plans. (Fewer of these entries are needed if Accumulation Mode was selected on the previous sheet.) All these are then ported to schedules on later sheets where the entries may be edited and fine-tuned.[5]

[3] To view the entire list of hidden sheets, click on Format -> Sheet -> Unhide. A dialog box with a scrollable list of the hidden sheets will pop up.

[4] Military analogs are often insightful. In a campaign that may run longer than expected it is prudent to have supplies and ammunition for that contingency in the pipeline. Rather than less of them, in case the campaign finishes early.

[5] Judgment needs to be exercised about some of these data entries. If there is a single amount of cash expected from sale of a business in a certain year then enter that amount on a later sheet. If part time work is anticipated for the first five years of retirement then enter it on this sheet, and delete the out-year entries on the later sheet. So you do whichever will require less editing.

NOTE: Dollar Values are in Year 2010 Dollars

	Client Income	
	First Person	Second Person
Pre-Retirement Indexed Earnings	$150,000	$25,000
Pre-Retirement Indexed Other Taxable		
Pre-Retirement Non-indexed Taxable		
Pre-Retirement Indexed Tax-Exempt		
Pre-Retirement Non-indexed Tax-Exempt		
Retirement Indexed Earnings		
Retirement Indexed Other Taxable		
Retirement Non-indexed Taxable		
Retirement Indexed Tax-Exempt		
Retirement Non-indexed Tax-Exempt		
Social Security	$27,876	$27,876

	Client Contributions	
	First Person	Second Person
Personal Savings	$20,000	
Profit Sharing	$10,000	
401-K	$15,500	
Deductible IRA		
Non-Deductible IRA		
Roth IRA		
401-K Company Match	100.0%	

	Client Expenses	
	Couple	Survivor
Pre-Retirement Indexed	$75,000	$70,000
Pre-Retirement Non-Indexed	$0	$0
Retirement Indexed	$100,000	$85,000
Retirement Non-Indexed	$0	$0

There are one or two columns of entries depending on whether the one or two-person case was selected on the previous sheet. Some two-person cases may be accurately and more quickly rendered as one-person cases. But if there are sources of income for both parties it is preferred to treat it as a two-person case – there is less chance for error and it will be easier to check and double-check entries.

Notice that every source of income is either indexed for inflation or not, and is either taxed or not. This needs no further explanation. Enter as appropriate.

You may enter earnings that will then be indexed for inflation and need to edit, because there is room for salary growth *beyond inflation*, especially for someone who is several

years from retirement. Older versions of the program did not have a slot for untaxed income and that omission is addressed in RSP.

Social Security is indexed to represent your expectations as to how it will track with other cost of living increases. An entry for that is on the next sheet. You or your clients are responsible for estimating the starting SS amount – we do not supply a calculation for that.

For the savings entries note that Profit Sharing does not come out of income – it is an employer contribution. All the other savings amounts do come out of income, with proper tax treatment; e.g., Deductible IRA and 401K contributions are treated as tax-deductible. Note, we have added a treatment of Non-deductible IRA contributions. (In reality those Deductible and Non-deductible IRA contributions amounts may all be in one fund, but we keep them segregated.)

It is important to note that the user is responsible for all contributions being allowable. We do not have code for example to check whether a $2,000 limit for Deductible IRA contribution has been exceeded.

The 401-K Company Match is applied to the combined 401-K contributions of both parties in a two-person case. If the company match is significantly different for the two parties, either enter an approximate blended rate or add the dollar amount of the match to the Profit Sharing contributions.

Client Expenses means **all spending other than taxes**. Social Security and Medicare taxes will be withheld from earnings by the program, and Federal, State and Local taxes will be calculated and paid.

Note the block of entries for Survivor. These are relevant if the ages you entered imply one person will outlive the other one. It may be foreseen in that event that spending amounts will change.

3. Client Assumptions

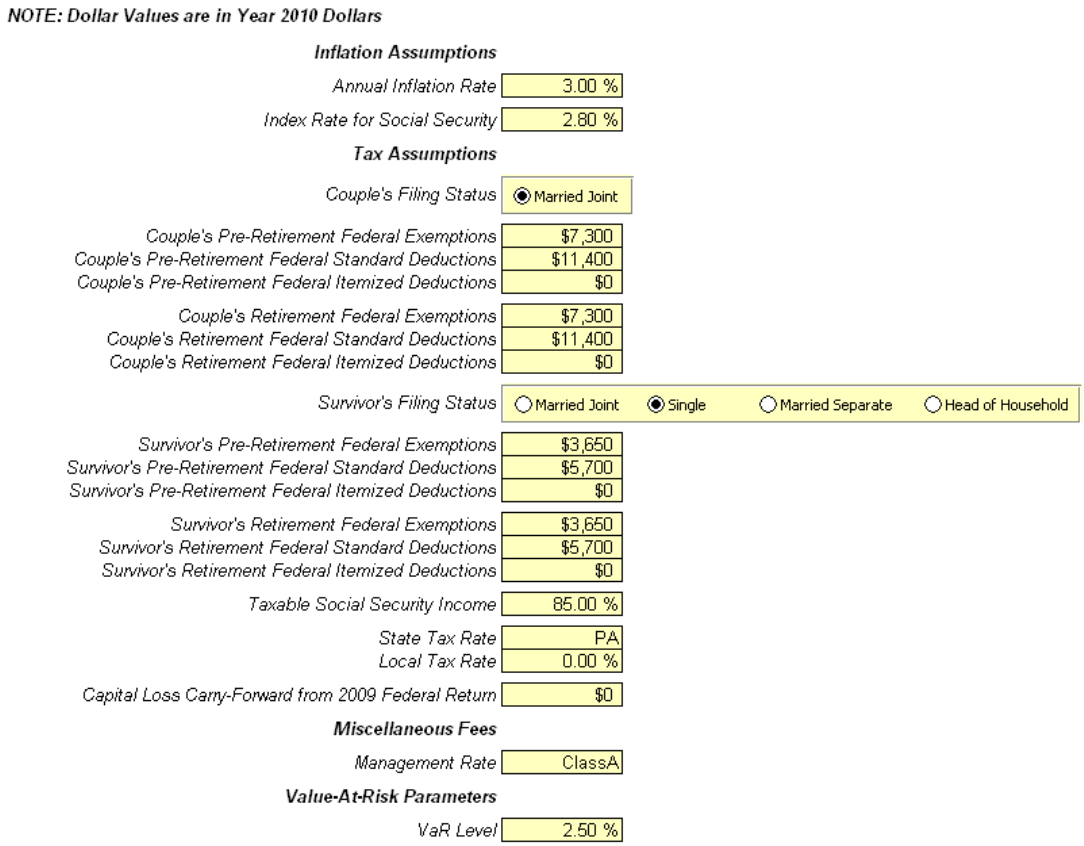
This page contains necessary information about inflation, the client's tax status, miscellaneous fees, and parameters that control the calculation of certain portfolio statistics.

There are two slots for assumptions about inflation. One is for your estimate of how Social Security payments will increase, and one for everything else. Some programs have a model for inflation also behaving randomly, RSP does not.

The next block of entries has to do with deductions for federal income tax, pre- and post-retirement. If the client itemizes enter $0 for Standard Deductions, and if the client does

not itemize enter $0 for Itemized Deductions.[6] If both entries are positive you will get an error message. Note that these entries will be ported to a schedule and indexed up by the inflation entry you made. This represents our *best estimate* as to how these allowable amounts will grow as the years go by and inflation occurs.[7] All these tax entry boxes go away if you elect to disable the tax model on the Client Basics sheet.

The program has a model for Social Security and Medicare taxes and no entries for them are required. Earlier versions of RSP did not do this.



NOTE: Dollar Values are in Year 2010 Dollars	
Inflation Assumptions	
Annual Inflation Rate	3.00 %
Index Rate for Social Security	2.80 %
Tax Assumptions	
Couple's Filing Status	(•) Married Joint
Couple's Pre-Retirement Federal Exemptions	$7,300
Couple's Pre-Retirement Federal Standard Deductions	$11,400
Couple's Pre-Retirement Federal Itemized Deductions	$0
Couple's Retirement Federal Exemptions	$7,300
Couple's Retirement Federal Standard Deductions	$11,400
Couple's Retirement Federal Itemized Deductions	$0
Survivor's Filing Status	( ) Married Joint (•) Single ( ) Married Separate ( ) Head of Household
Survivor's Pre-Retirement Federal Exemptions	$3,650
Survivor's Pre-Retirement Federal Standard Deductions	$5,700
Survivor's Pre-Retirement Federal Itemized Deductions	$0
Survivor's Retirement Federal Exemptions	$3,650
Survivor's Retirement Federal Standard Deductions	$5,700
Survivor's Retirement Federal Itemized Deductions	$0
Taxable Social Security Income	85.00 %
State Tax Rate	PA
Local Tax Rate	0.00 %
Capital Loss Carry-Forward from 2009 Federal Return	$0
Miscellaneous Fees	
Management Rate	ClassA
Value-At-Risk Parameters	
VaR Level	2.50 %

The block of entries for Survivor is relevant if the ages you entered imply one person will outlive the other one. It may be foreseen in that event that tax exemptions and deductions will change as well as spending and you can make the appropriate changes.

You can enter a flat rate for the state and local tax rate. You can also enter a graduated state tax rate if you access a hidden sheet to be discussed later. Activate that schedule by typing in the two-letter symbol for the state. Similarly we have a mechanism for accessing a management fee schedule, to be discussed later.

[6] The program will add the State and Local Taxes incurred to the Itemized Deductions, in any year that the client itemizes.

[7] If you think differently, just edit by hand, perhaps by inserting a different inflation factor in the Excel formula bar.

We have included a slot for entering your client's Capital Loss Carry-Forward from last year's Federal tax return. In most cases this value would be insignificant, although some of our users have inherited clients with sizable prior losses. This value is not used if you select Accumulation Mode, or if you have disabled the Automatic Payment of Taxes.

The final entry on this sheet is the VaR Level, which is used to calculate the Value at Risk, as described in Appendix D.

4. First and Second Details

These sheets contain schedules for entries already made on the previous two sheets, and blank columns where no entry was made. First Details refers to entries for First Person, and Second Details refers to entries for Second Person.

All entries are available for editing here, using standard Excel editing techniques. Here you can refine salary growth for example, or have spending in retirement gradually taper off with age.

You can replace the contents of any cell by selecting that cell and typing another number. You can copy down by grabbing the handle in the lower right corner of a cell and dragging it downwards as far as appropriate. Or you can double click on the handle and that entry will be copied to the bottom of that column. You can also edit the Excel formula bar to perform more sophisticated maneuvers.

So, for example, you might plan for gradually reducing spending by setting the value in a cell equal to the previous cell multiplied by .995, and then copying that entry down, reducing spending by an additional half of one percent each year.

Note the following extremely important feature. All dollar amounts on the First Details sheet are expressed in current dollars. Where appropriate, these amounts will be indexed upwards for inflation subsequently. They are presented here in current dollars to allow you to edit them with amounts that you are estimating in current dollars, but expect to be larger due to inflation.

For example, the client may anticipate paying for college tuition starting ten years from now and wants to enter that extra spending for a four-year period starting ten years from now. He may have an intuitive understanding of what college costs are today, and can enter that number, assuming it will be inflated by the same amount as other cost of living increases.

Other expenses or income may be known about in absolute terms, such as the proceeds from insurance or a previously agreed-upon note payment. Those entries will be made later on the Detailed Inputs sheet, not here.

Note: The detailed expenses, exemptions, and deductions for a Couple are located on the First Details sheet; these details for the Survivor are located on the Second Details sheet.

Advanced Feature: Some of our users like to create sophisticated Excel formulas that refer to cells on the detailed sheets. In previous versions of RSP, they were required to store these formulas on separate worksheets, forcing them re-enter them when they switched between client cases. RSP 3 provides hidden cells to be used to enter any user-defined data or formulas. These hidden cells will be saved in the Client Case File, along with the other input data. The hidden area is named "FirstUserDefinedTable" on First Details, and "SecondUserDefinedTable" on Second Details. To make these cells visible, first use Tools→Protection→Unprotect Sheet to unlock the sheet, and then enter the name of the hidden area in Excel's Name Box. Now use Format→Column→Unhide to reveal the cells, and you are ready to enter formulas or data.

5. Detailed Inputs

This sheet now has all the amounts on First and Second Details indexed for inflation and added together, and a couple of new entries.

This is where you can incorporate amounts that are known in absolute dollars, whether expenses, savings, or income. However, if an Indexed slot for an input is available on First or Second Details, it is easier to enter absolute dollar amounts there. The only instances where you must enter these absolute dollar amounts on the Detailed Inputs sheet are those situations where a different inflation assumption is required.

There is a schedule of IRA to Roth IRA Conversions on this sheet, which will allow you to convert any percentage of the Deductible IRA and Non-Deductible IRA accounts into your Roth IRA accounts. The appropriate taxes on these transfers will be paid, but no penalty for early withdrawal will be applied. The transfers will be made according to the current allocations of the Deductible IRA and Non-Deductible IRA accounts. If you wish to spread the tax burden across multiple years, then use conversion percentages that are less than 100%. For example, to perform a full conversion, but pay the tax bill over the subsequent 2 year period, enter 0% for this year, 50% for next year, and 100% for the following year.

Also on the Detailed Inputs sheet is the Tax-deferred Distribution schedule. By default we enter the minimum percentages starting at age 70 for the first person, assuming joint life for the two persons. As allowed, if their age difference is ten years or less, we make the calculation as if the age difference is equal to ten years. If the age difference is more than ten years we make the calculation based on actual joint life. For a single person (or the Survivor) we calculate joint life assuming a fictitious partner who is ten years younger. Clicking the Switch button at the top of this column will toggle between the ten year joint life (Individual) and the joint life using the actual age difference (Joint). Unless the two persons' ages are more than ten years apart, the actual schedule will be identical regardless of the switch setting. In most cases there is no reason to switch to Individual, so we recommend leaving it set to Joint.

These numbers may be edited. The user is responsible for those entries – we do not enforce any required minimums or exact penalties. Of course you can always withdraw more, and may have to in order to support spending. The user is then responsible for checking on any rules involving substantially equal withdrawals.[8]

The withdrawals can be set to zero to use the program to examine trust or other investment issues where there are no required withdrawals.

As permitted, there are no required withdrawals from the Roth IRA account, unless all other funds are depleted.

Advanced Feature: RSP 3 provides hidden cells to be used to enter any user-defined data or formulas. These hidden cells will be saved in the Client Case File, along with the other input data. The hidden area is named "DetailedUserDefinedTable" on Detailed Inputs. Refer to the Advanced Feature section of First and Second Details for the instructions to access these hidden cells.

Bonus Advanced Feature: RSP 3 provides hidden cells to be used to enter a schedule of Withdrawal Caps, used to limit the use of your portfolio to satisfy your spending goals. These hidden cells will be saved in the Client Case File, along with the other input data. The hidden area is named "DetCaps" on Detailed Inputs. Refer to the Advanced Feature section of First and Second Details for the instructions to access these hidden cells.

The withdrawal cap may be useful when working with problem cases. It is based on the premise that no more than a certain percentage of the total portfolio should be withdrawn if it is to be depended on for a number of years. A safe withdrawal rate depends both on the portfolio composition and on the number of years it has to last. Assuming the portfolio has a healthy proportion of equities, we have devised some good rule-of-thumb withdrawal rates that are activated if you click the Switch button, toggling the text above that column to ON.

So if you activate the withdrawal caps here is what happens. If the cap for that year is x% and the desired spending input would require withdrawal of more than x% of total portfolio, then spending is forced to be reduced by enough to satisfy the cap restriction. That reduction will be evident in the Spending Achieved chart on the Detailed Charts sheet, if it occurs in enough of the replications.

[8] Since this is a Monte Carlo program it is conceivable that in some replications larger than minimum withdrawals are needed to support spending; we then do *not* recompute the withdrawal schedule as should be done to avoid a penalty. This will not happen in most sensible plans, and is not an inaccuracy that should cause concern.

RSP comes with the withdrawal cap OFF (set equal to 100%) as the default mode. This is the standard way to run the program. There is danger in running the program with the withdrawal cap enabled if you do not thoroughly understand the implications. You may be led falsely to think that desired spending is occurring and there is no problem because final wealth is still positive, but that might be because spending is drastically below the desired.

You may also experiment with withdrawal caps of your own devising. Just edit the numbers in the column by hand.

6. Account Performance

The next several sheets deal with portfolio characteristics: what does the client now have, how is it invested, how will accounts be used to support spending, and how will it be rebalanced over the years. These structures in RSP are vastly more detailed and powerful than in the earlier versions of the program. At first sight it may seem daunting and over-elaborate, but it is actually very simple, very powerful, and incorporates functionality that experienced users have asked for.

The big difference is we now allow for a more elaborate market profile. Previously, the world of investments was summarized simply by having Equities and Fixed Income (taxed or not taxed). Now the world of investments, or the market profile, can be described by as many as eleven asset classes, and the user may set up as many different asset class breakdowns as desired. RSP comes loaded with two of these: Standard Asset Classes, and Size-Value Asset Classes. We also now supply carefully chosen default numbers for returns, volatilities, and correlations, for those two profiles.

The discussion for now will be about how to use the Standard Asset Classes. There will be more below about how to choose and define alternative market profiles. Do be aware, however, that even the Standard Asset Classes can be edited. You can redefine or rename any or all of them, and change the returns and volatilities as you wish. But, it is probably better practice to leave them exactly as supplied and create other market profiles which you will name.

<< HOME >> Account Management

Market Profile and Performance

Account Types	Average Annual Return	Annual Volatility	Annual ST CGD	Taxable ST CGD?	Annual LT CGD	Withdrawal Priority	Tax-Managed Fund?	Management Fee	Tax Efficiency
Large Value	9.00%	13.00%	2.00%	Y	2.00%	3	Y	0.10%	75.00%
Large Growth	7.00%	17.00%	2.00%	Y	2.00%	3	N		
Small Value	12.00%	16.00%	2.00%	Y	2.00%	3	N		
Small Growth	10.00%	21.00%	2.00%	Y	2.00%	3	N		
International Large	8.00%	16.00%	2.00%	Y	2.00%	3	N		
International Small	12.00%	23.00%	2.00%	Y	2.00%	3	N		
Real Estate	9.00%	13.00%	0.00%	Y	0.00%	4	N		
Short Term Fixed Income	3.00%	3.00%	0.00%	Y	3.00%	2	N		
Intermediate Fixed Income	4.00%	4.50%	0.00%	Y	4.00%	2	N		
Municipals	4.00%	4.50%	4.00%	N	0.00%	2	N		
Money Market	1.00%	0.90%	0.00%	Y	1.00%	1	N		

SOURCE: Standard.xls

DESCRIPTION: Standard Asset Class Selection - July 2003 Revision

On the Account Performance sheet you see eleven asset classes with their default returns, volatilities and also dividend and capital gains distribution (CGD) performance. The latter are needed, for Taxed accounts, because dividends and CGDs generate taxes when they occur. There is also a column for tax-exempt dividends meant to cover those slots used for municipal bonds or bond funds.

As with earlier versions of the program, *dividends* and *CGDs* are paid as a fixed percentage of the balance of the respective fund. The *return* is drawn from a lognormal distribution with parameters average return and volatility (standard deviation). So the growth in per share value is essentially *return – dividend - CGD*. An Appendix goes into more detail about how this process is modeled. Suffice it to say here, our tax model wants to know what portion of the total return is subject to immediate taxation. Default values for dividends and CGDs are given for the standard asset classes, based on advice from our consultant, also updated periodically at http://mathfinance.wagner.com/.

2003 Tax Reform: The Jobs and Growth Tax Relief Reconciliation Act of 2003 has been incorporated into RSP Versions 3.10 and beyond, and has necessitated a change in the way dividends are input. Prior to this version, dividends and short-term CGDs were combined, while long-term CGDs were a separate input. The slot you use for dividends now depends on the tax-exempt status of the asset class. If the dividends are tax-exempt, like municipal bonds or bond funds, then set the Taxable ST CGD entry to “N”, and include the dividend rate in the Annual ST CGD entry. If the dividends are taxable at capital gains rates, then set the Taxable ST CGD entry to “Y”, and include the dividend rate in the Annual LT CGD entry. If the dividends are taxable at regular income rates, then set the Taxable ST CGD entry to “Y”, and include the dividend rate in the Annual ST CGD entry.

The Withdrawal Priority entry allows the user to specify which accounts and in what order are gone after to support spending and taxes. Put 1 for the account you use in practice, usually the cash account. You can put several 1's if there are several that you would use equally. Then put 2's for the accounts you would go to next, and so on. Bear in mind that elsewhere you will specify a rebalancing scheme so that these ready money accounts may be replenished annually. In practice many advisors use a process where they put say five years' worth of spending in cash and only replenish it when "the market is up" or some such strategy. We do not model that detail, nor is it needed for the RSP process.[9]

The Tax-Managed Fund entry allows the user to designate accounts that have tax-managed alternatives. These tax-managed alternatives will have performance adjustments made, but only to the accounts included in the Personal Savings portfolio. The Management Fee represents the reduction in return that results when you use the tax-managed alternative. The Tax Efficiency measures how well the tax-managed alternative is able to reduce the fund's taxable income, the dividends and capital gains distributions. If no Tax-Managed Fund entry is set to "Y", the Management Fee and Tax Efficiency columns will be hidden.

The Account Management button is used to create other market profiles or to call them up to replace the current performance data on the sheet. This button also is used to edit correlation data and the default rebalancing scheme, or to consolidate performance data for up to five investments.

Each market profile is labeled with a Source and Description. The Source is the name of the Excel workbook that stores the performance data, while the Description provides some brief details regarding the makeup of that profile.

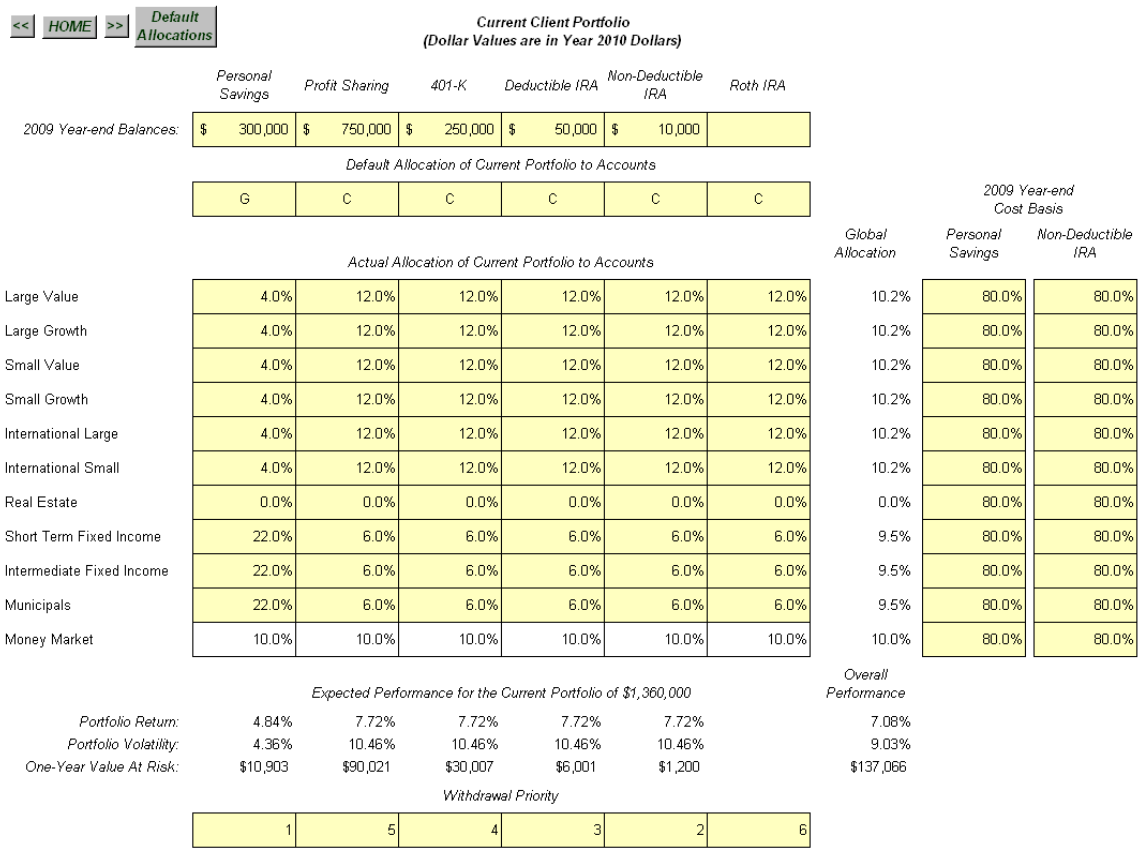
The market profiles are stored in separate files in the *Accounts* sub-folder. If a colleague sends you one of these files, just put it in your *Accounts* sub-folder and you may begin using with it in your copy of RSP. If you revise that profile, Save it and give the file back to your colleague.

Warning: Be very careful when sharing market profiles. The onus is upon you and your colleagues to coordinate the saving of changes to shared files.

Note that a market profile can be defined to suit advisors who engage in active portfolio management. The eleven slots can be used alternatively to represent market sectors such as Technology, Energy, Transportation, etc. The user will have to supply appropriate return/volatility/correlation numbers.

7. Current Portfolio

[9] Not to say it should not be done in practice. Advisors should do whatever it takes to stretch their clients' dollars. Another example is loss harvesting which can save a lot of tax expense. Modeling it in RSP, however, would be very difficult and inappropriate.



<< HOME >> Default Allocations

Current Client Portfolio
(Dollar Values are in Year 2010 Dollars)

	Personal Savings	Profit Sharing	401-K	Deductible IRA	Non-Deductible IRA	Roth IRA
2009 Year-end Balances:	$ 300,000	$ 750,000	$ 250,000	$ 50,000	$ 10,000	
Default Allocation of Current Portfolio to Accounts	G	C	C	C	C	C

Actual Allocation of Current Portfolio to Accounts							Global Allocation	2009 Year-end Cost Basis: Personal Savings	2009 Year-end Cost Basis: Non-Deductible IRA
Large Value	4.0%	12.0%	12.0%	12.0%	12.0%	12.0%	10.2%	80.0%	80.0%
Large Growth	4.0%	12.0%	12.0%	12.0%	12.0%	12.0%	10.2%	80.0%	80.0%
Small Value	4.0%	12.0%	12.0%	12.0%	12.0%	12.0%	10.2%	80.0%	80.0%
Small Growth	4.0%	12.0%	12.0%	12.0%	12.0%	12.0%	10.2%	80.0%	80.0%
International Large	4.0%	12.0%	12.0%	12.0%	12.0%	12.0%	10.2%	80.0%	80.0%
International Small	4.0%	12.0%	12.0%	12.0%	12.0%	12.0%	10.2%	80.0%	80.0%
Real Estate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80.0%	80.0%
Short Term Fixed Income	22.0%	6.0%	6.0%	6.0%	6.0%	6.0%	9.5%	80.0%	80.0%
Intermediate Fixed Income	22.0%	6.0%	6.0%	6.0%	6.0%	6.0%	9.5%	80.0%	80.0%
Municipals	22.0%	6.0%	6.0%	6.0%	6.0%	6.0%	9.5%	80.0%	80.0%
Money Market	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	80.0%	80.0%

Expected Performance for the Current Portfolio of $1,360,000						Overall Performance
Portfolio Return:	4.84%	7.72%	7.72%	7.72%	7.72%	7.08%
Portfolio Volatility:	4.36%	10.46%	10.46%	10.46%	10.46%	9.03%
One-Year Value At Risk:	$10,903	$90,021	$30,007	$6,001	$1,200	$137,066

Withdrawal Priority						
	1	5	4	3	2	6

On this sheet we describe the current holdings, according to the Asset Class breakdown chosen on Account Performance. Put the dollar amounts in each account on the top row. The allocation of each account onto the asset classes can be accomplished by selecting one of the symbols A through J, as per definitions made (or accepted as defaults) on the Rebalancing Schedules sheet. Those schedules can be edited and then the symbol will be modified (to say "A based" instead of "A") to indicate it is a variant.

Note that cost basis is needed for the two accounts Personal Savings and Non-Deductible IRA. It is a common mistake to forget to do this, leaving a remnant number from some other case. If it is set too low the model will be charging more tax than it should; if it is set too high the model will not be charging enough tax. Sometimes advisors need to prepare a preliminary rough plan and the client does not have the cost basis information handy. In that case enter a reasonable guess based on recent market trends.[10]

Finally you must indicate priorities for withdrawals. These should be the six unique numbers 1 through 6. The number 1 is usually assigned to Personal Savings and the number 6 to Roth IRA, the intermediate ones being not very significant. (Especially since Profit Sharing and 401-K roll into Deductible IRA upon retirement.) Withdrawals will be made first from the priority 1 portfolio, until it has been depleted, after which the

[10] Rough planning can be done quickly with many of the entries estimated or guessed at. Don't pass on an opportunity to provide advice and insight just because you don't have all the data!

remaining portfolios are tapped in increasing priority order. Withdrawals within each portfolio are made according to the Withdrawal Priority assigned to each account (asset class).

This sheet displays a collection of current portfolio statistics to help users see the implications of their inputs. The Global Allocation is calculated from the dollar amount in each account, along with the individual allocations of each account onto the asset classes, so that users will know how their entire portfolio is allocated among the eleven asset classes. The Expected Portfolio Return and Volatility, along with the current 1-year Value at Risk (see Appendix D), also are provided for each account, and for the entire portfolio.

8. Rebalancing Plan

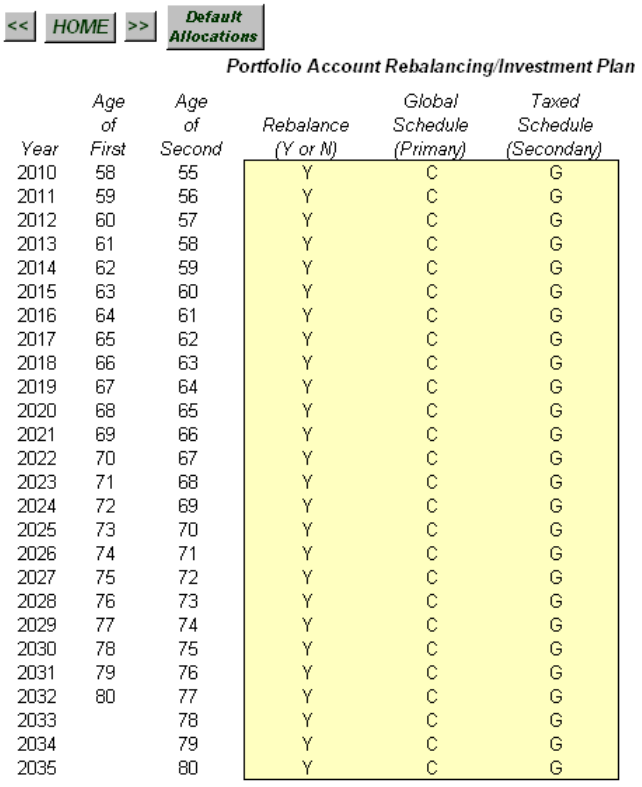
On this sheet you specify the rebalancing scheme you desire as the years progress, using the array of balances defined on the Rebalancing Schedules sheet. The Rebalancing Method buttons on the Client Basics sheet allow you to choose between two rebalancing methods: the Global/Taxed scheme and the Deferred/Taxed scheme.

The Global/Taxed scheme is comprised of two planned allocations for each year: a Global Allocation that is the primary goal of the plan, and a Taxed Allocation that is the secondary goal. The program begins by temporarily assuming the Personal Savings accounts have the specified Taxed Allocation. It then attempts to rebalance the entire portfolio to achieve the specified Global Allocation, by transferring funds among accounts in each of the following portfolios in turn: Deductible IRA, Roth IRA, 401-K, and Profit Sharing. If the desired Global Balance remains unachieved, the program makes a pass through the Personal Savings accounts, in a final attempt to achieve the Global Balance. While the Non-Deductible IRA accounts are tallied when determining the Global Balance, the program never transfers funds within that portfolio, as the tax consequences of making these transfers could be considerable. Thus the algorithm achieves the stated Global plan, and attempts to achieve and at least approximates the Taxed plan. If you do not care what your Taxed Allocation is, you can eliminate the secondary goal by setting the Taxed entries to NONE.

The Deferred/Taxed scheme is comprised of two independently planned allocations for each year: a Tax-Deferred Allocation and a Taxed Allocation. The program first attempts to rebalance the Tax-Deferred portfolio to achieve the specified Tax-Deferred Allocation, by transferring funds among accounts in each of the following portfolios in turn: Deductible IRA, Roth IRA, 401-K, and Profit Sharing. While the Non-Deductible IRA accounts are tallied when determining the Tax-Deferred Balance, the program never transfers funds within that portfolio, as the tax consequences of making these transfers could be considerable. Finally, the program rebalances the Taxed portfolio to achieve the specified Taxed Allocation.

We have users who prefer the Global/Taxed scheme, and those who prefer the other. We suspect that both of them are useful in certain circumstances.

The Rebalancing Plan sheet is initialized with formulas that refer to the previous year's entry, with the first year's Global (or Tax-Deferred) and Taxed entries set to C and G respectively. This saves you typing by allowing you to enter a new schedule to begin in a specific year, and subsequent years will be changed automatically.



Year	Age of First	Age of Second	Rebalance (Y or N)	Global Schedule (Primary)	Taxed Schedule (Secondary)
2010	58	55	Y	C	G
2011	59	56	Y	C	G
2012	60	57	Y	C	G
2013	61	58	Y	C	G
2014	62	59	Y	C	G
2015	63	60	Y	C	G
2016	64	61	Y	C	G
2017	65	62	Y	C	G
2018	66	63	Y	C	G
2019	67	64	Y	C	G
2020	68	65	Y	C	G
2021	69	66	Y	C	G
2022	70	67	Y	C	G
2023	71	68	Y	C	G
2024	72	69	Y	C	G
2025	73	70	Y	C	G
2026	74	71	Y	C	G
2027	75	72	Y	C	G
2028	76	73	Y	C	G
2029	77	74	Y	C	G
2030	78	75	Y	C	G
2031	79	76	Y	C	G
2032	80	77	Y	C	G
2033		78	Y	C	G
2034		79	Y	C	G
2035		80	Y	C	G

9. Rebalancing Schedules

On this sheet you define some standard portfolios comprised of the eleven chosen asset classes. For consistency with some of our code it is desirable to use the available labels A through J to represent a gradually more conservative sequence of portfolios. Note that the last asset class, Money Market, is treated differently – it is calculated so that the row adds up to 100%. If you enter numbers that tote to more than 100% you will get an error message as you exit this page.

This sheet displays a collection of current portfolio statistics to help users see the implications of their inputs. The Expected Portfolio Return and Volatility, along with the current 1-year Value at Risk (see Appendix D), are provided for each standard portfolio. However, where the Value at Risk is displayed in dollars on the Current Portfolio sheet, the value shown here is as a percentage of the amount invested in that standard portfolio.

Advanced Feature: Some users will prefer to use labels that are more descriptive than the single letters A through J. Simply use Tools→Protection→Unprotect Sheet to unlock the sheet, and then replace A through J with your own labels. When you enter the name of one of these schedules on the Current Portfolio, Rebalancing Plan, or Analysis Controls input sheets, you will need to enter these names exactly as they appear on the Rebalancing Schedules sheet. You also may need to widen columns on the sheets that display these labels.

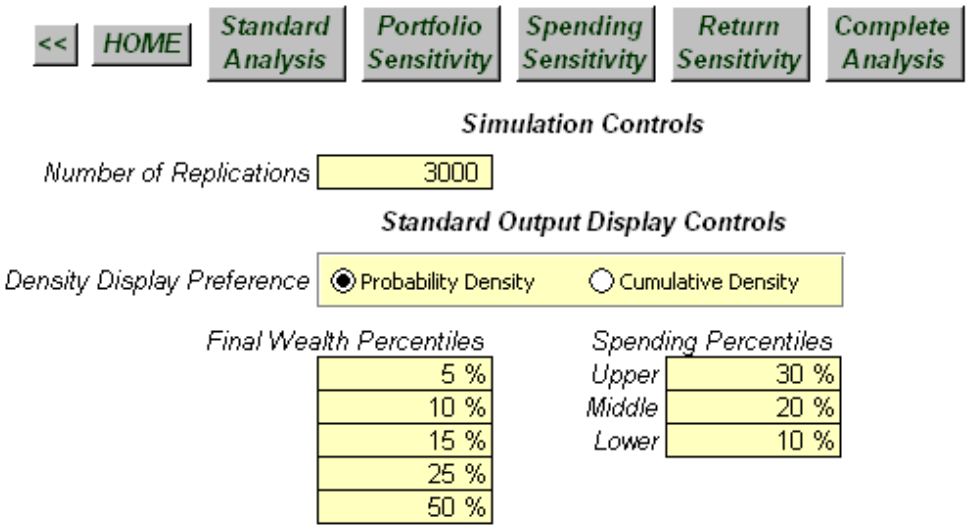
<< HOME Commit to Changes

Portfolio Account Rebalancing/Investment Plan - Default Schedules

	Large Value	Large Growth	Small Value	Small Growth	International Large	International Small	Real Estate	Short Term Fixed Income	Intermediate Fixed Income	Municipals	Money Market	Expected Return	Volatility	One-Year VaR
A	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	0.0%	0.0%	0.0%	0.0%	10.0%	8.80%	12.92%	15.2%
B	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	0.0%	2.0%	2.0%	2.0%	10.0%	8.44%	12.10%	14.2%
C	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	0.0%	6.0%	6.0%	6.0%	10.0%	7.72%	10.46%	12.0%
D	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	0.0%	10.0%	10.0%	10.0%	10.0%	7.00%	8.85%	9.8%
E	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	0.0%	14.0%	14.0%	14.0%	10.0%	6.28%	7.26%	7.6%
F	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	0.0%	18.0%	18.0%	18.0%	10.0%	5.56%	5.75%	5.5%
G	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	0.0%	22.0%	22.0%	22.0%	10.0%	4.84%	4.36%	3.6%
H	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	0.0%	26.0%	26.0%	26.0%	10.0%	4.12%	3.27%	2.3%
I	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.0%	28.0%	28.0%	28.0%	10.0%	3.76%	2.95%	2.0%
J	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	30.0%	30.0%	30.0%	10.0%	3.40%	2.85%	2.2%

10. Analysis Controls

This sheet launches the analysis, either the basic analysis, the sensitivity tests, or the complete analysis.

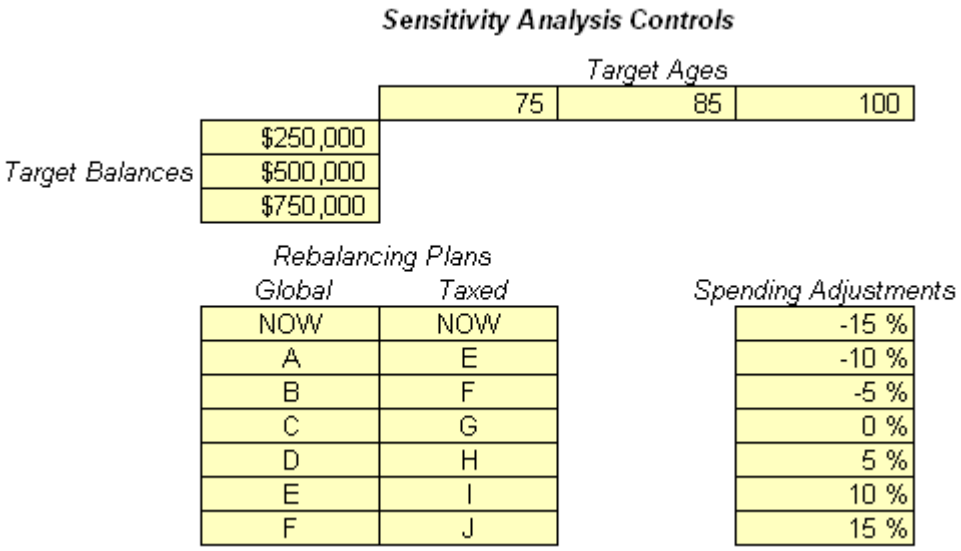


But first, certain display controls are entered here. Depending on how fast your machine is you can either leave the number of replications (reps) at 3000, or use fewer while still hunting and pecking for a workable plan. The basic trend of a plan is seen using as few as 500 reps, but the graph of the distribution will look ragged. For final presentation use at least 3000 reps – the graph will have a smoother more pleasant look. Do your own

experiments to confirm that there is no point going beyond that – not much chance that additional outliers will be generated, and the graph will not change much.

A key output is the probability distribution of wealth at the target age, and other years along the way. Some users prefer to see this expressed as a cumulative distribution F, and others prefer to look at the probability density f. That is a matter of taste – in either event the most important information, certain percentiles picked off the distribution, are shown also.[11]

The key percentiles to be displayed on the output sheets are chosen here. RSP will display 5 key percentiles for wealth distributions, and 3 key percentiles for the spending achieved. The default values are our suggestion as to the most informative. We strongly recommend that you never show upper percentiles, like 75%. These are upside potential numbers, distracting, irrelevant, and not to be dwelt upon. They might cause the client not to focus on what *is* important – minimizing downside risk. On the other hand showing very low percentiles like 1 or 2% might be alarming. Few people can afford 98 or 99% safety. A plan that is 95% safe is very good, and everyone should be pleased to have attained that level. There is not much point in mentioning that it is not 98% safe. Those last few percent come at great cost, which you can find out by doing some experiments.



The remaining inputs on this sheet are relevant only to the sensitivity studies. The Target Balances are three amounts that represent different levels of your client's ambition regarding the dollar value of their estate. The Target Ages are three different ages that represent key milestones in a client's life, such as retirement age and the age at the end of the analysis. The sensitivity studies will produce a table containing the probability of your client's portfolio value being below the three Target Balances at each of the three

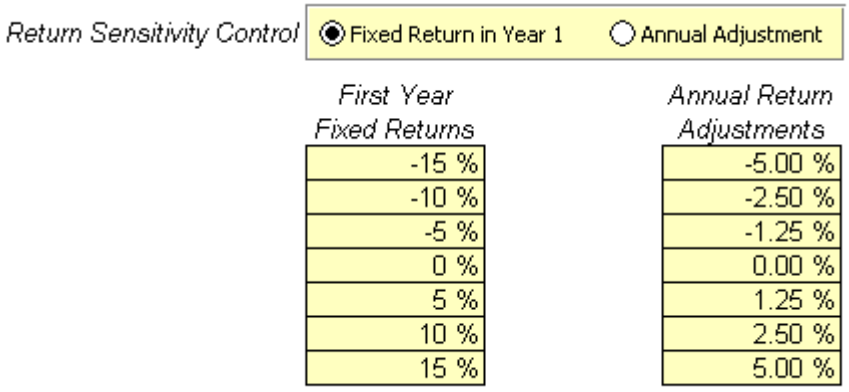
[11] For those who are not familiar with this, for the cumulative, F(x) is the probability wealth is less than or equal to x, and for the density, f(x) is the probability that wealth is equal to something in the vicinity of x.

Target Ages, for seven different variations in their financial plan. These tables allow your client to make a quick comparison of the impact of changes to their current plan. RSP provides two such studies: Portfolio Sensitivity and Spending Sensitivity.

The Portfolio Sensitivity study requires seven candidate Rebalancing Plans, all of which use either the Global/Taxed scheme or the Deferred/Taxed scheme. Each of the seven plans will begin with their portfolio allocated as defined on the Current Portfolio page. Specifying NOW corresponds to the rebalancing plan that is defined on the Rebalancing Plan sheet. Specifying A-J will rebalance to the allocation corresponding to that specific letter, as defined on the Rebalancing Schedules sheet.

The Spending Sensitivity study will compare the impact of making an across the board percentage reduction/increase in the client's current spending plan. These percentages are applied to the schedule of Annual Expenses from the Detailed Inputs sheet, without regard to any minimum or maximum living expenses that might limit your client.

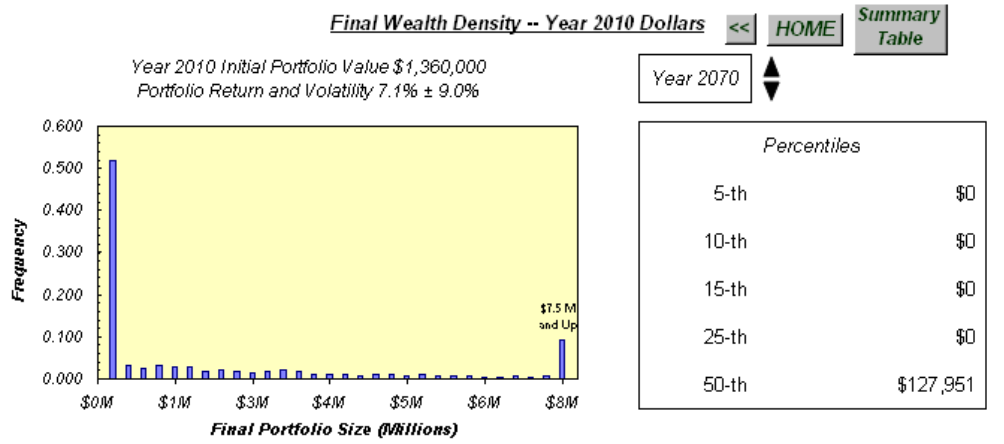
The Complete Analysis will display shortened versions of both of these sensitivity studies. The Target Balances, Rebalancing Plans, and Spending Adjustments are used for these shortened tables, but the probabilities displayed will be for the Age to End Analysis.

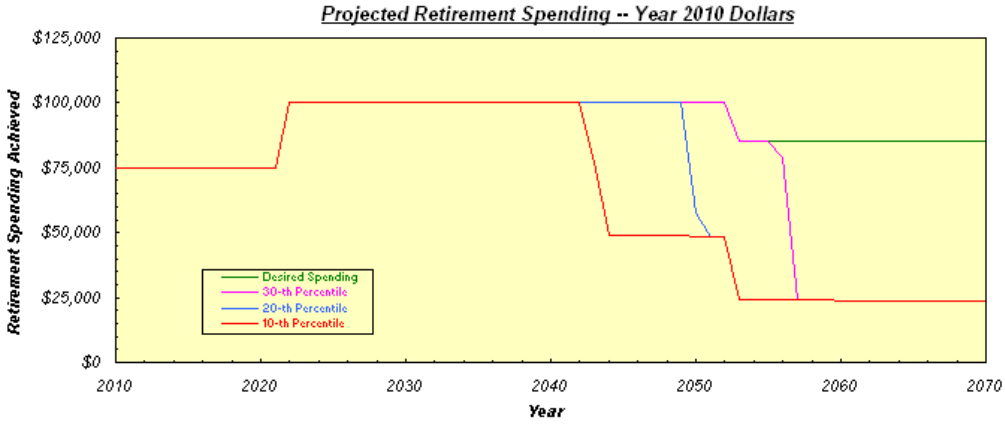


The previous two sensitivity studies allow you to compare the impact of changes that your client makes to their plan. RSP now has two types of Return Sensitivity studies that allow you to examine the effects of unexpected market performance, or so-called "Black Swan" events. Selecting "Fixed Return in Year 1" will start the simulation with a market-wide fixed return, to model such an event in the first year of the analysis period. This attempts to answer the question "if my portfolio has a significant loss this year, will I need to change my future plans?" Selecting "Annual Adjustment" will reduce or increase the random returns by a constant value each year, to model the effects of unexpected performance for the duration of the analysis. This attempts to answer the question "what if the market does not behave as well as your projections suggest?"

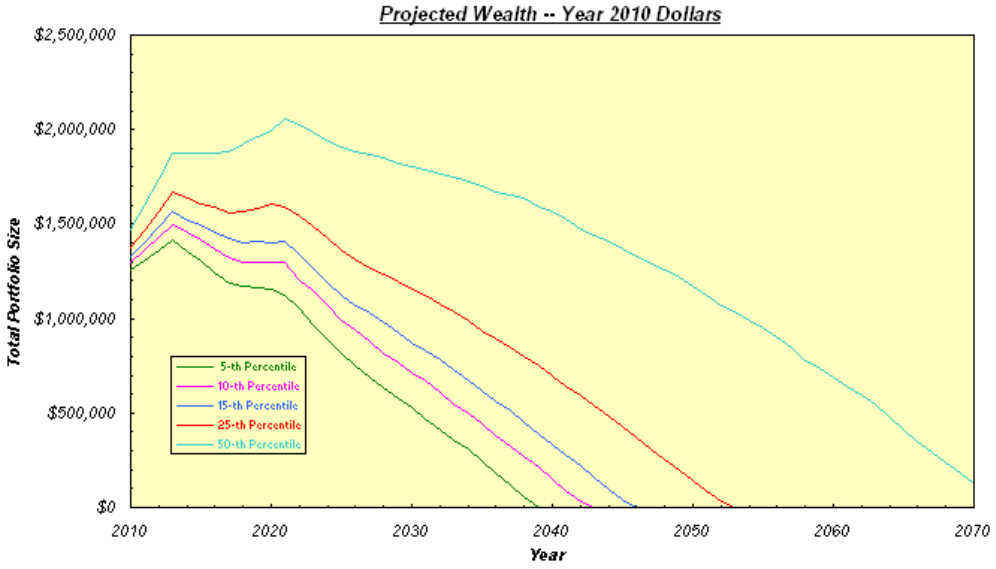
Please note: if you set up the exact same case that we have shown so far, and run the program, you could get output that differs slightly from the sheets in the manual. That is because the version of the program you are using contains updated correlation data and perhaps some algorithmic enhancements.

11. Output Sheets





Name Demo Date 4/23/2010 Case Base



The output graphs are identical in format to those in earlier versions of the program. We show the probability distribution (as either a density or a cumulative) with key percentiles (the ones you chose) picked off, key statistics on a timeline as to spending achieved, and the time history of key percentiles of total wealth. We show the same results, side by side, in both nominal and inflation-adjusted dollars[12].

Clicking one of the Summary Table buttons (nominal or inflation-adjusted) will produce a tabular report (Detailed Tabular sheet) with detailed year-end statistics (arithmetic means and standard deviations) on income, spending, taxes, and the investment portfolio. Separate year-end statistics are provided for the taxed and tax-deferred portfolios, including portfolio amounts, transactions (deposits and withdrawals), allocations of the asset classes, return and volatility, and management fees paid.

To reduce the amount of information displayed on the Detailed Tabular sheet, we have hidden the columns containing some of these fields. Users who disagree with our choice of the statistics displayed are encouraged to use Tools→Protection→Unprotect Sheet and Format→Columns→Unhide to reveal any of these columns, or Format→Columns→Hide to eliminate any from appearing on this sheet.

Note the example illustrated is your typical case with troubles looming and unsuspected. The median looks fine but because spending is just below the after-tax after-inflation return there is a 48% chance the portfolio is drained. It represents a typical occurrence for clients who have been running deterministic analyses and led to believe that they are using a safe withdrawal rate. Appendix F discusses how to address a troubled situation in general, and applies those suggestions to this example.

The sensitivity studies are similar to those in earlier versions, but a bit more elaborate for portfolio sensitivity. For that we compare the current portfolio and rebalancing plan with six additional choices for the Global Rebalancing (entire portfolio) and the Taxed Rebalancing (Personal Savings only) from the A-J menu.

Portfolio Investment Strategies -- Year 2010 Dollars

(Global Strategy, Taxed Strategy)

	Age of First	(NOW, NOW)	(A, E)	(B, F)	(C, G)	(D, H)	(E, I)	(F, J)
Probability	75	1.00	0.99	0.99	1.00	1.00	1.00	1.00
Total Wealth	85	0.92	0.93	0.93	0.92	0.91	0.89	0.84
> $250,000	100	0.70	0.78	0.76	0.70	0.59	0.42	0.20
Probability	75	0.98	0.97	0.98	0.98	0.98	0.99	0.99
Total Wealth	85	0.85	0.88	0.87	0.85	0.82	0.76	0.63
> $500,000	100	0.64	0.74	0.71	0.64	0.51	0.33	0.11
Probability	75	0.94	0.93	0.94	0.94	0.93	0.93	0.91
Total Wealth	85	0.78	0.82	0.81	0.78	0.73	0.61	0.41
> $750,000	100	0.58	0.70	0.67	0.58	0.44	0.24	0.07

Example: If you invest your portfolio in investment strategy (D,H), then there is a 100% chance you will have more than $250,000 at age 75.

[12] There are advocates for both. To us it seems easier for a client to understand and relate to a presentation in today's inflation-adjusted dollars. He knows what $1 is worth today, but probably not what $10 is worth in the year 2030.

Set the three Target Balances to dollar amounts that represent perhaps different levels of ambition. Set the three Target Ages to different ages that span the client's life expectancy, plus or minus a few years. Looking at these numbers quickly reveals that changes to a more aggressive portfolio might help but not nearly enough.

For the spending sensitivity test, percentage adjustments are applied across the board to the entire spending plan. You should choose adjustments that make sense for the case under consideration. If the client is in a marginal situation and current spending is likely to cause the portfolio to be drained, you want to set all the numbers to represent reductions in spending. If the client is in a very comfortable situation you might include some increases in spending to show him that his spending can safely be increased somewhat. For our test case it appears 15% spending reductions would solve the problem, but we'd prefer to find a package of more palatable remedies.

Spending Plan Strategies -- Year 2010 Dollars

	Age of First	*15 % Decrease*	*10 % Decrease*	*5 % Decrease*	*Original Plan*	*5 % Increase*	*10 % Increase*	*15 % Increase*
Probability	*75*	1.00	1.00	1.00	1.00	0.99	0.99	0.98
Total Wealth	*85*	0.99	0.98	0.96	0.92	0.87	0.80	0.74
> $250,000	*100*	0.93	0.86	0.79	0.70	0.59	0.50	0.40
Probability	*75*	1.00	0.99	0.99	0.98	0.97	0.95	0.92
Total Wealth	*85*	0.97	0.94	0.90	0.85	0.79	0.72	0.64
> $500,000	*100*	0.88	0.81	0.73	0.64	0.54	0.44	0.36
Probability	*75*	0.98	0.97	0.96	0.94	0.91	0.87	0.83
Total Wealth	*85*	0.93	0.89	0.84	0.78	0.72	0.63	0.55
> $750,000	*100*	0.82	0.75	0.67	0.58	0.48	0.40	0.32

Example: If you increase your spending plan by 5% then there is a 99% chance you will have more than $250,000 at age 75.

Our users tell us that the output from these tests make particularly effective presentation material to clients.

We expect that the output from the new Return Sensitivity studies also will be effective tools for reviewing “Black Swan” events with your clients. If your client’s current plan has not been “hardened” against the possibility of another unexpected downward market trend, the output from these tests should help you open their eyes.

Sensitivity to Unexpected Returns in First Year -- Year 2010 Dollars

	Age of First	15 % Loss in Year 2010	10 % Loss in Year 2010	5 % Loss in Year 2010	Zero Growth in Year 2010	5 % Growth in Year 2010	10 % Growth in Year 2010	15 % Growth in Year 2010
Probability	75	0.98	0.99	0.99	0.99	1.00	1.00	1.00
Total Wealth	85	0.79	0.83	0.87	0.90	0.92	0.93	0.95
> $250,000	100	0.48	0.53	0.59	0.65	0.69	0.72	0.76
Probability	75	0.93	0.95	0.96	0.97	0.98	0.98	0.99
Total Wealth	85	0.69	0.74	0.78	0.82	0.85	0.88	0.90
> $500,000	100	0.41	0.47	0.52	0.58	0.63	0.67	0.71
Probability	75	0.81	0.85	0.89	0.91	0.93	0.95	0.96
Total Wealth	85	0.57	0.63	0.69	0.74	0.77	0.81	0.83
> $750,000	100	0.36	0.41	0.46	0.51	0.56	0.61	0.65

Example: If you experience 5 % growth in year 2010, then there is a 100% chance you will have more than $250,000 at age 75.

Sensitivity to Unexpected Returns in All Years -- Year 2010 Dollars

	Age of First	Returns Get 5 % Reduction	Returns Get 2.5 % Reduction	Returns Get 1.25 % Reduction	No Change to Annual Returns	Returns Get 1.25 % Increase	Returns Get 2.5 % Increase	Returns Get 5 % Increase
Probability	75	0.71	0.95	0.98	1.00	1.00	1.00	1.00
Total Wealth	85	0.11	0.54	0.78	0.92	0.98	1.00	1.00
> $250,000	100	0.01	0.16	0.41	0.70	0.89	0.98	1.00
Probability	75	0.41	0.82	0.93	0.98	1.00	1.00	1.00
Total Wealth	85	0.06	0.39	0.66	0.85	0.96	0.99	1.00
> $500,000	100	0.00	0.11	0.33	0.64	0.86	0.97	1.00
Probability	75	0.22	0.65	0.83	0.94	0.98	1.00	1.00
Total Wealth	85	0.03	0.28	0.54	0.78	0.93	0.98	1.00
> $750,000	100	0.00	0.08	0.27	0.58	0.83	0.96	1.00

Example: If you experience 1.25 % higher returns each year, then there is a 100% chance you will have more than $250,000 at age 75.

The Complete Analysis button launches a simulation that summarizes the Standard Analysis, Portfolio Sensitivity, and Spending Sensitivity in a single concise report. If the new Return Sensitivity studies also are well received by our users, we will add these analyses to this report in a future release of the software.

XYZ Incorporated (your firm name goes here)

Report for: *April 23, 2010*

Client: *Demo*

Case: *Base*

Summary of Portfolio Value at Target Year 2070

Your Wealth Distribution has these characteristics:

48% chance of completely exhausting your portfolio

50% chance of having more than $127,951

50% chance of having less than $127,951

Portfolio Sensitivity at 2070 – Chance of Having Selected Target Amounts, by Notional Portfolios

	(NOW,NOW)	*(A,E)*	*(B,F)*	*(C,G)*	*(D,H)*	*(E,I)*	*(F,J)*
$250,000	0.48	0.64	0.60	0.48	0.32	0.13	0.02
$500,000	0.45	0.62	0.57	0.45	0.29	0.10	0.01
$750,000	0.42	0.59	0.55	0.42	0.25	0.08	0.01

Spending Sensitivity at 2070 – Chance of Having Selected Target Amounts, by Adjusted Spending Schedule

	15 % Decrease	*10 % Decrease*	*5 % Decrease*	*Original Plan*	*5 % Increase*	*10 % Increase*	*15 % Increase*
$250,000	0.77	0.68	0.58	0.48	0.39	0.30	0.23
$500,000	0.73	0.64	0.55	0.45	0.37	0.28	0.22
$750,000	0.69	0.61	0.51	0.42	0.34	0.26	0.20

The detailed charts are accessible from this report, although many users may choose to present only this summary report to their clients. Users may enter their company name on this summary report, and may customize the formatting if they wish.

Users are encouraged to design and implement their own report formats. That's one of the reasons for building RSP on Excel. Remember the caution to do that without cutting *any* of our cells: create your own harmless copies and have at them!

12. Reminders

- Navigate with >> when you wish to port new entries, with the tabs when you need to preserve edits.
- Use Accumulation Mode if you want to model a specific pre-retirement savings plan without bothering with entries for income, spending and taxes. If you choose Income Mode, the pre-retirement income must be sufficient to cover the savings plan; otherwise the plan will be reduced to fit the income. Then, when spending and taxes are addressed, withdrawals from the portfolio may occur.
- If the ages of a married couple are more than ten years apart, enter as a two-person case.
- Enter amounts in current dollars that you want to be indexed for inflation on First or Second Details; enter absolute dollar amounts on Detailed Inputs. In cases where both an Indexed and a Non-Indexed slot are available on First or Second Details, it is much easier to make the entries on those sheets.
- Check that you have entered the cost bases correctly. Setting them to zero will cause your entire withdrawal from the Personal Savings portfolio to be taxed at capital gains rates. A zero cost basis in the Non-Deductible IRA portfolio will cause those withdrawals to be fully taxable as regular income.

Part III – The Hidden Sheets

There are several hidden sheets that allow you to customize certain features, tweak our assumptions, or generally experiment and fool around. Some sheets get unhidden in the process of running the program – others remain ever-hidden until you unhide them by going to Format→Sheets→Unhide.

1. Account Correlation

RSP comes loaded with correlations for two market profiles. If you create your own profiles you have to supply returns, volatilities, and correlations. The latter can be tricky. If the resulting matrix is not positive definite (a technical mathematical property which basically means a legitimate correlation matrix) then we have a situation where the simulation cannot proceed and you will get an error message.

How can a matrix of correlations fail to be legitimate? Suppose you have asset classes X, Y, and Z. Suppose X and Y have correlation .9, and Y and Z have correlation .9. Then the correlation between X and Z must be pretty high, right? (If Tom looks a lot like his brother Joe, and Joe looks a lot like his brother Basil, then Tom probably looks a bit like Basil.) Mathematically, given the two correlations of .9, then the correlation between X and Z cannot be less than .62. Anything higher than .62 is allowable.

This difficulty can actually arise even if correlations were calculated from real data, due to round off errors. It can also happen by copying only the first two significant digits from data that would work if you copied four digits. So, use the numbers we give you, and if you want to change them, you've been warned!

2. Management Fees

The sheet ManagementFeeClassA is included as an example. Note that you can edit it to create additional breaks and any marginal fees you care to insert.

Create additional Management Fee sheets by copying the default sheet to a new (inserted) sheet with the name ManagementFeesYourName. Use the same format as ours. Then use YourName as the Management Rate entry on the ClientAssumptions sheet and that schedule will be active for that case.

These sheets will not be hidden automatically by RSP. If you want to hide them, use Format→Sheets→Hide.

Saving Changes: These sheets are not saved in your Client Case files, so you must do an Excel Save to preserve any modifications you have made to them.

3. Tax Tables

Similarly you can edit the tax tables to change thresholds and marginal rates, to experiment or to represent non-US situations. You will have to do this also if you choose to not continue your maintenance contract.

You can even change the number of breakpoints by editing the numbers in Column 5. Other types of changes can be made but you may need help from our technicians.

Warning: Do not change the integers in columns 1 or 3, try to create a new filing status, or cut any of our numbers.

Saving Changes: This sheet is not saved in your Client Case files, so you must do an Excel Save to preserve any modifications you have made to it.

4. State Tax

Edit ours, or copy our sheet (use Excel's Edit->Move or Copy Sheet) and rename it with the name StateTax followed by the two-letter abbreviation for the state. Change the schedules for all four filing statuses, using the same format as ours.

These sheets will not be hidden automatically by RSP. If you want to hide them, use Format→Sheets→Hide.

Saving Changes: These sheets are not saved in your Client Case files, so you must do an Excel Save to preserve any modifications you have made to them.

5. ARL

These are the IRS published average remaining lifetimes. Ignore the first three columns. (They are there for a future contingency when we might need individual ARLs for male and female.) The numbers in the block to the right of that are joint numbers. We use those to fill the Tax-deferred Distributions column on the DetailedInputs sheet.

6. Portfolio Consolidation

This is a worksheet that can be used to consolidate numbers for up to five investments. It will calculate the consolidated return and volatility based on input returns, volatilities and correlations, then allow you to cut and paste the consolidated numbers to a slot on the AccountPerformance sheet.

7. Configuration

This worksheet is used to specify the contents of Client Case files and Account Performance files. It is helpful to *us* to have it when we make changes to the code. Users should not change anything on this sheet.

Part IV – Appendices

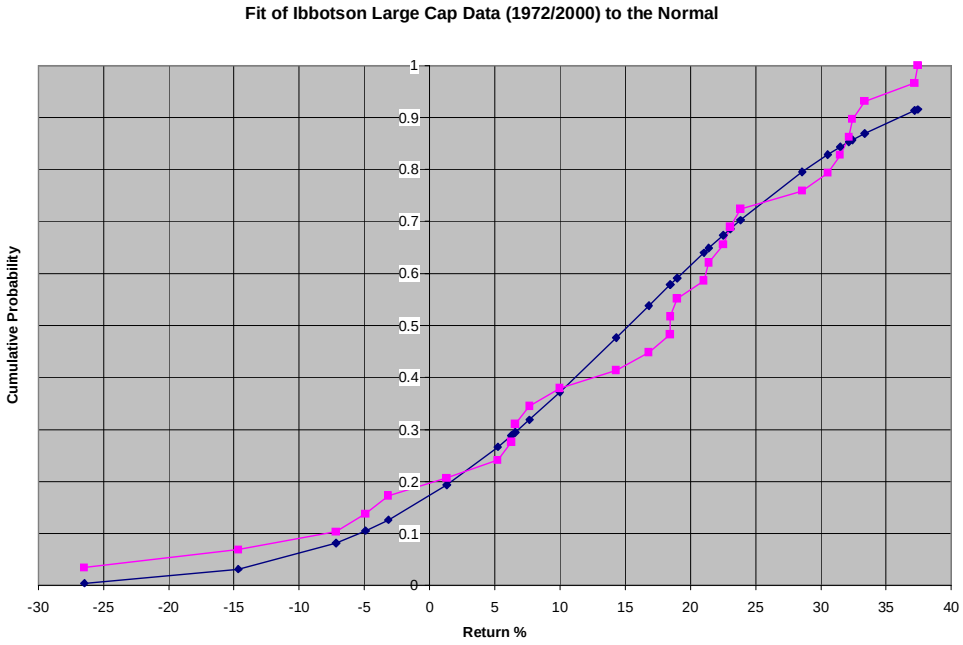
Appendix A. Modeling of Investment Returns

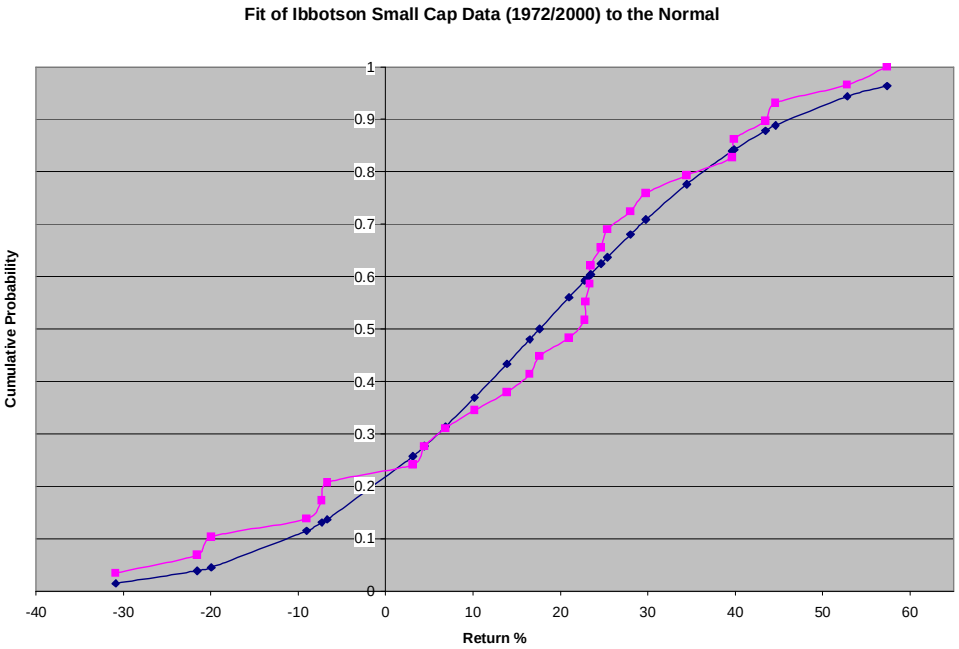
Use of the normal distribution. There has been much published lately on this subject by authors espousing a variety of viewpoints. It is true that daily return data show symptoms of non-normality, with fat tails and peaked centers. But monthly returns do not exhibit that kind of non-normality. For retirement planning daily and even monthly returns are not the issue. We only need to model annual returns and they are quite Gaussian in appearance, and pass the usual goodness-of-fit tests. See The Economics of Financial Markets by Campbell, Lo, and MacKinlay, Princeton University Press, 1997, section 1.4, for a recent thorough discussion by competent scientists.

We also give here the results of fitting ten years (1991 through 2000) of monthly returns to the normal distribution for several familiar Vanguard funds. We show the maximum absolute discrepancy between the cumulative distribution of the monthly returns and the fitted normal. That quantity is the basis of the KS test described in Kendall, Stuart, and Ord, p. 1192. (Advanced Theory of Statistics, Volume 2, OUP, 1991) The table shows that the test statistic is within the 5% significance level of .0809 for a sample size of 120 for all but one of the funds (Windsor II). The problem with the monthly Windsor II data is not leptokurtosis, however. It does not have fat tails nor is it overly peaked; its problem is a sparseness of values in the interval (.02, .67). This is a very quirky data set. However, the annual returns for the fund are quite normal looking. (If monthly returns fit or nearly fit the normal, then quarterly and annual numbers will fit all the more so by a Central Limit Theorem argument.)

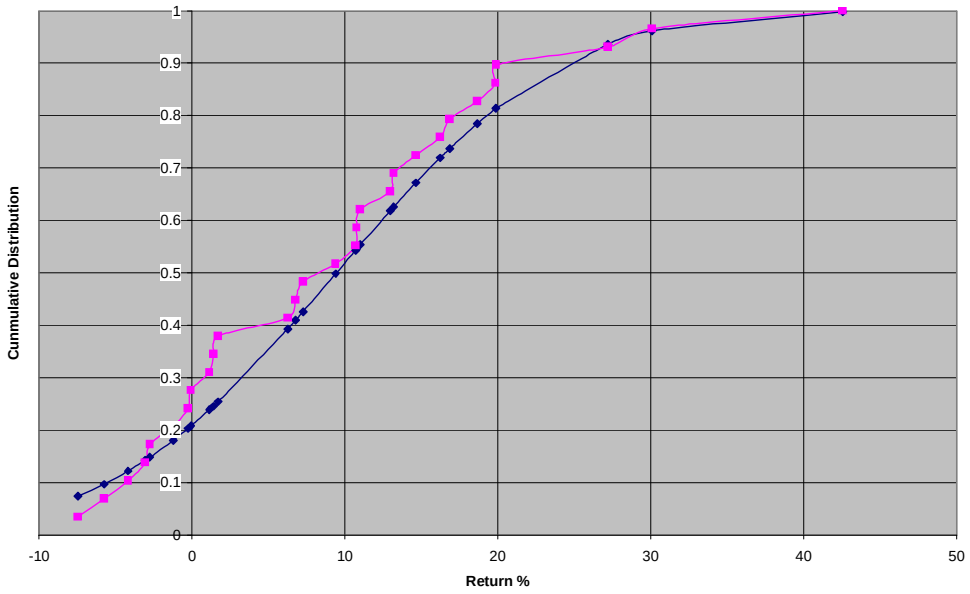
Vanguard Fund	Monthly Returns	Standard Dev.	Max. Discrep.
Explorer	1.545	5.586	.0537
GNMA	0.632	0.950	.0593
LT Corp	0.747	1.806	.0444
S&P 500 Idx	1.417	3.860	.0522
Morgan	1.402	4.536	.0433
PRIMECAP	1.830	4.700	.0433
Health Care	1.981	3.843	.0626
Energy	1.174	5.755	.0752
STAR	1.119	2.454	.0680
Wellesley	0.954	1.955	.0572
Wellington	1.133	2.657	.0746
Windsor	1.388	4.375	.0713
Windsor II	1.374	3.778	.1011
US Growth	1.398	4.732	.0547
International Growth	0.902	4.061	.0372

As further evidence we include an analysis of annual return data from Ibbotson's Year Book, from the years 1972 to 2000, for Large Cap, Small Cap, Long Term Corporate, and Treasury Bills indices. For a sample of size 29 the 5% significance level is .1645. The KS statistics for these four data sets are, respectively, .0953, .0776, .1252, and .153, all passing at that 5% level. For visual evidence we show the fit between the empirical cumulative and the normal with the same mean and variance, for each of the four data sets, in the four inserted figures.

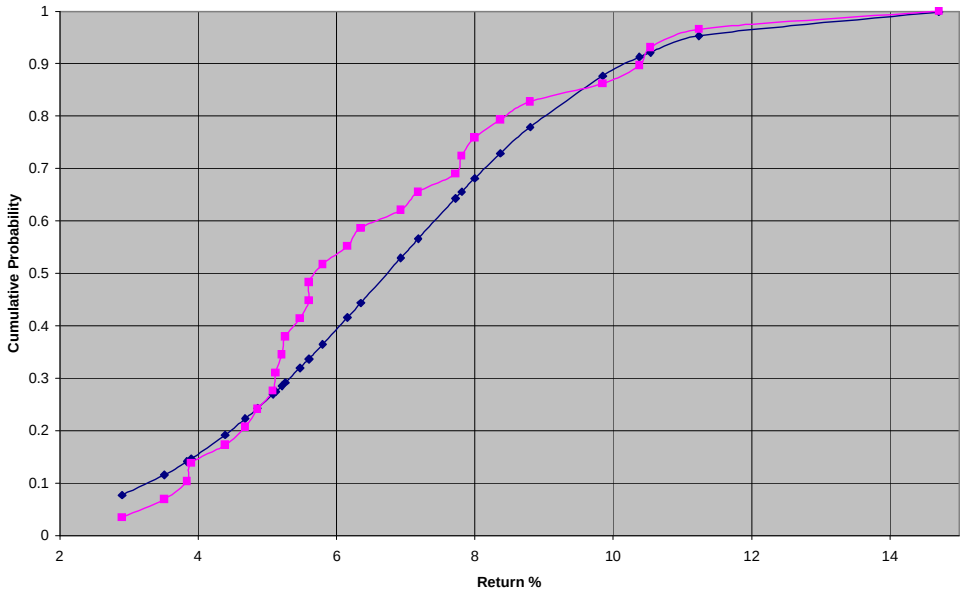




Fit of Ibbotson Longterm Corp Data (1972/2000) to the Normal



Fit of Ibbotson Tbill Data (1972/2000) to the Normal



Appendix B. Use of the lognormal distribution

We use the lognormal distribution to represent the multiplicative effect of returns, exp(X), where X is normal with mean m and standard deviation s. We might as well have used 1 + X as the multiplier since exp(x) is approximately equal to 1 + x but exp(x) is guaranteed to be positive and 1 + x is not and we need to protect against that possibility for users who like to stress the program by entering enormous volatility values.

As a technical matter, we actually make a transformation to the input mean return m and volatility s, to cause the resulting lognormal distribution to have the desired first two moments.

A lognormal distribution with parameters μ and σ has mean

$$1 + m = \exp(\mu + \frac{1}{2}\sigma^2)$$

and variance

$$s^2 = (1+m)^2\left(\exp(\sigma^2) - 1\right).$$

So we solve those two equations for the unknowns μ and σ and use them to create a lognormal which has all the desired properties.

Finally, a comment on why we do not use resampled historical data. The main reason is that we *prefer* to allow users to use their judgment as to what returns may average, going forward. As we write this, for example, some economists are forecasting market returns for the next five years being below what they have been for the past ten years by as many as 100 to 250 basis points. A financial planner would not be able to take advantage of this expert opinion if we were locked into historical returns. And, with this approach, they can in effect use historical returns by matching means and volatilities. So you get to have it both ways with our approach.

Appendix C. Cash Flow in RSP

RSP allows the user to run the Monte Carlo simulation in two primary modes during the pre-retirement phase: Accumulation Mode and Income Mode. In Accumulation Mode, a savings schedule and an annual expenses schedule are submitted for each year before retirement, representing deposits to and withdrawals from accounts for that year. The simulation loop then does only the following tasks: makes required minimum distributions from tax-deferred accounts; pays management fees; makes the designated deposit to or withdrawal from the portfolio accounts; rebalances the portfolio; and computes and applies returns to the accounts. No tax consequences are considered during pre-retirement in Accumulation Mode.

In Income Mode, by contrast, schedules for income, annual expenses, and savings are entered. A savings schedule is submitted from the starting year out to any year in the simulation, but most sensibly out to the year in which both parties have retired. A schedule of annual expenses also is submitted for every year in the simulation. Detailed income inputs, tax inputs, and other miscellaneous inputs also are entered. The simulation loop considers all tax consequences, etc., and has a rule-based methodology to address shortages and surpluses.

For each year simulated, certain activities take place: investments have returns drawn from a lognormal distribution, income from various sources occurs, required minimum distributions from tax-deferred accounts take place, planned savings are deposited, taxes and management fees are incurred and paid, spending takes place, and the portfolio is rebalanced. These cash flows are tracked for all the years being simulated, and key statistics to support our reports are saved. The following sections of this appendix describe each of these activities in sequence.

Compute Portfolio Management Fees

The input management fee schedule is applied to the total current portfolio value, to determine the portfolio management fees due from your client for the current year. This amount will be combined with your client's annual expenses and the current tax bill to determine the spending needs for the year.

Rollover Profit Sharing and 401-K Portfolios

Beginning at retirement age, the current value of each Profit Sharing and 401-K account is transferred to the corresponding account in the Deductible IRA portfolio. This is a tax-free rollover.

Convert IRA to Roth IRA

Amounts in the Deductible IRA and Non-Deductible IRA portfolios are converted to the Roth IRA portfolio, according to the schedule of percentages input on the Detailed Inputs sheet. This percentage is applied to each Deductible IRA and Non-Deductible IRA account, and the resulting dollar amounts are withdrawn from those accounts, and deposited in the corresponding accounts in the Roth IRA portfolio.

Withdrawals from the Deductible IRA accounts will be taxed as ordinary income. The capital gain on withdrawals from the Non-Deductible IRA accounts also will be taxed as ordinary income. This capital gain (or loss) is calculated by subtracting the pro-rated cost basis from the withdrawal amount. The total cost basis then is updated by subtracting the pro-rated cost basis. No penalty will be applied to these withdrawals.

Withdraw Required Distributions

Required minimum distributions (RMDs) are made from the tax-deferred portfolio (Profit Sharing, 401-K, Deductible IRA, and Non-Deductible IRA only), according to the schedule of percentages input on the Detailed Inputs sheet. This percentage is applied to the total value of these tax-deferred accounts, to determine the dollar amount of the RMD. Withdrawals are made from the tax-deferred portfolio according to the user-specified portfolio and account withdrawal priorities, until the entire RMD amount has

been satisfied. The total amount withdrawn will supplement the income inputs, and will be used to satisfy the annual expenses, portfolio management costs, and the first tax bill installment. Any remaining amount will be deposited to the taxed portfolio.

Withdrawals from the Profit Sharing, 401-K, and Deductible IRA accounts will be taxed as ordinary income. The capital gain on withdrawals from the Non-Deductible IRA accounts will be taxed as ordinary income. This capital gain (or loss) is calculated by subtracting the pro-rated cost basis from the withdrawal amount. The total cost basis then is updated by subtracting the pro-rated cost basis.

Deposit to Tax-deferred Portfolio

If there is not enough available income to implement your client's planned pre-retirement savings to the Roth IRA, Deductible IRA, Non-deductible IRA, and 401-K portfolios, those planned values will be reduced to the level of available income. These reductions are made according to the following rules:

> Profit Sharing is an employer contribution, so it will be made in full no matter what your client's income may be.
>
> 401-K, Deductible IRA, Non-Deductible IRA, and Roth IRA are individual contributions, so they only are made if the income inputs for that year will support them.
>
> The income that supports the 401-K, Deductible IRA, Non-Deductible IRA, and Roth IRA contributions is the sum of the following items on the Detailed Inputs sheet: Earnings and Other Taxable Income. If the sum of these contributions exceeds the sum of these income inputs, then the contributions will be reduced. These reductions are made in the following order: Roth IRA, Non-Deductible IRA, Deductible IRA, and 401-K.

This revised plan, along with the unmodified Profit Sharing savings, is deposited to the appropriate tax-deferred portfolios. Deposits to the Deductible IRA and 401-K portfolios will be deducted from regular income for the purpose of calculating the federal tax bill. Amounts deposited to each Non-Deductible IRA account will be added to that account's cost basis.

Compute and Pay Taxes

The next step in the cash flow analysis is to compute this year's taxable income and the resulting taxes incurred. The key issue to note here is that we have not yet made any discretionary withdrawals, nor have we determined the income from dividends or capital gains distributions. Therefore, any taxes incurred due to taxable income from these sources will be paid in the following year. In any year that the client's itemized deductions are positive, the State and Local Taxes incurred are added to the itemized deductions and exemptions input.

This step is not performed during pre-retirement if the user has selected Accumulation Mode.

Deposit to Taxed Portfolio

If there is not enough available income to implement your client's planned pre-retirement savings to the Taxed portfolio, the planned value will be reduced to the level of available income. The net income that supports the Personal Savings contributions is the sum of Earnings, Other Taxable Income, Social Security, and Tax-Exempt Income, minus the sum of Annual Expenses, unpaid taxes from the previous year, management fees, and the tax-deferred contributions made. If the Personal Savings contribution exceeds this net income, then the contribution will be reduced. If this net income exceeds the input Personal Savings contribution, the excess will either get added to the contribution or spent, depending upon the setting of the "Disposition of Excess Income" flag. Amounts deposited to each Personal Savings account will be added to that account's cost basis.

Meet Expenses (Spending)

The spending needs (desired expenses plus current tax bill and portfolio management fees) for a given year will be addressed by drawing from wage earnings, social security, and the other income sources first. If required withdrawals have been made, then they too will be used to meet the desired spending. If the spending needs remain unmet, discretionary withdrawals will be made from the Taxed, 401-K, Profit Sharing, Deductible IRA, Non-Deductible IRA, and Roth IRA portfolios according to the Withdrawal Priority specified on the Current Portfolio sheet. Within each portfolio, withdrawals are made according to the Withdrawal Priority specified on the Account Performance sheet. Withdrawals from accounts with the same priority will be made proportionately.

If the user has selected Accumulation Mode, this step is simplified during pre-retirement. The current year's annual expenses (including management fees) you have entered for your client are withdrawn from the portfolio according to the Withdrawal Priorities described above. These typically are zero, but your client may have particular pre-retirement spending needs that must be satisfied by dipping into their portfolio. If the user has overridden the schedule of required minimum distributions, causing required withdrawals to begin during pre-retirement, then these withdrawals will be used to satisfy the client's spending needs before making discretionary withdrawals from the portfolio.

Withdrawals from the Profit Sharing, 401-K, and Deductible IRA accounts will be taxed as ordinary income. The capital gain on withdrawals from the Non-Deductible IRA accounts will be taxed as ordinary income. The capital gain on withdrawals from the Personal Savings accounts will be taxed as capital gains. Capital gains (or losses) are calculated by subtracting the pro-rated cost basis from the withdrawal amount. The total cost basis then is updated by subtracting the pro-rated cost basis. Even though no tax will be incurred during pre-retirement in Accumulation Mode, the cost basis will be updated to be available for tax calculations during retirement.

Rebalance Portfolio

Rebalancing will be performed using either the Global/Taxed scheme or the Deferred/Taxed scheme, as described in the Rebalancing Plan section. Redistribution occurs first within the Tax-deferred portfolio (Deductible IRA, Roth IRA, 401-K, then Profit Sharing), and then within the Taxed portfolio (Personal Savings), in order to

minimize the tax consequences of redistribution. Note that a final calculation of the tax bill will be made subsequent to this step, with any unpaid (or overpaid) taxes carried over to the next year.

Apply Returns

Randomly drawn asset class returns are now applied to the current portfolio amounts, resulting in the growth or shrinkage of the portfolio. At this point the dividends and capital gains distributions are calculated and recorded for tax purposes only. The cost bases for asset classes that incur dividends or capital gains distributions will have these amounts added to them, as they have already been taxed.

Compute Final Tax Bill

The final step in the cash flow is to compute this year's total taxes incurred. Any difference between this final tax bill and the amount paid previously will be paid or credited in the following year.

This step is not performed during pre-retirement if the user has selected Accumulation Mode.

Appendix D. Value at Risk

The concept of Value at Risk (VaR) is sometimes used as a rough, handy measure of the risk in a portfolio. The output from RSP itself is of course the ultimate measure of risk. But as an additional measure VaR can be a useful educational device. It can be defined in many ways, but here is how we implement it. We calculate the amount of dollars that might be lost in a single year in an unfavorable market, which might only occur *x*% of the time or less. Typical choices for *x* would be 2.5 or 5%. Assume the client's assets are invested in a portfolio that has expected return μ and volatility or standard deviation σ. At the 5% level then the loss might be

$$A\left(1-\exp\left(\mu+\sigma\cdot\Phi^{-1}(.05)\right)\right),$$

where A is the amount in the portfolio and Φ is the standard normal cumulative distribution function. A return of

$$\mu+\sigma\cdot\Phi^{-1}(.05)=\mu-1.645\sigma$$

or less, for the year, would only occur 5% of the time. Exponentiation converts to the lognormal multiplier for account growth, and 1 minus that is the dollar gain or loss depending on sign. In RSP, a positive VaR indicates a loss, while a negative VaR indicates a gain.

Appendix E. Long term planning

Users often comment on the fact that a very long term plan, like 40 or 50 years into the future, produces a very diffuse flattened-out distribution, with some significant probability of having very little money, and some significant probability of having a great deal of money, and small amounts of probability everywhere in-between. And they ask, how should we interpret this? Our answer is that the 50-year plan should make sense. It should, before being adopted, result in a very low probability of the bad event: having very little money at the target year. But then one should focus on an intermediate plan, perhaps 25 years out. Look at the successful 50-year plan and note the median of the probability distribution of wealth at the 25-year mark for that plan. If that amount is present in the account at the actual 25-year mark, then the plan is perhaps half way home.

It is analogous to military planning. As the war begins, the planners look at the long term objective and find short and intermediate term goals that will make necessary progress. In World War Two we had to be able ultimately to invade Japan. To do that we had to have bases from which to launch that attack. To get to that point we first had to gain control of the sea lanes and then win the Battle of Midway.

The analogy goes further. The initial planning is based on our best current information. As the war proceeds unforeseen events may cause us to have to revise the plan. "No plan survives contact with the enemy." So it is with financial planning. The enemies are inflation, poor returns, and unexpected expenses. When they appear, replanning is necessary.

Appendix F. Some advice to practitioners

Your first cut at a plan for a client will proceed by incorporating everything they have told you about earnings, other income, savings, spending, and how they are invested. One run of RSP will reveal whether they are on, close to being on, or way off track.

If they are on track you will find ways to improve their investments and make them even better off.

It's the other two possibilities that are more often the case and which will require work, and diplomacy. From our experience helping advisors learn to use our program we have a few suggestions.

Propose a menu of remedies no one of which will seem that onerous. The menu of options to work with is:

- Consider postponing retirement and working a couple more years.
- Take steps now to have a significant earned income in retirement by consulting or learning a new skill.
- Save more pre-retirement.
- Spend less pre-retirement.

- Plan to spend less in retirement, including a recognition that spending might even be additionally scaled back .5% or so each year after age 70.
- Get into a more aggressive portfolio especially in the earlier plan years.

Make small 2% adjustments in these and see if that package works. If not, make 3% adjustments. Continue until you get the desired 85% confidence. If the client appears willing, scale the spending back even more rather than make unrealistic assumptions about retirement income or a risky choice of a very aggressive portfolio. It's probably better to face the music and cut spending 15% than to go into a 90% equity portfolio.

The accompanying figure shows what happens to the case we have been showing throughout the manual, if certain remedies are chosen.

1. Remove the unrealistic assumption that the spouse might reach age 110.
2. Postpone retirement for four additional years.
3. Reduce pre-retirement and retirement spending each by 3%.
4. Reduce annual spending by an additional .3% each year after age 70.
5. Use a slightly more aggressive B portfolio for the entire portfolio until the primary wage earner reaches age 70, reverting to the C/G mix thereafter.

Try making these changes to the Base Case that comes loaded on your copy of RSP. You will find something like the accompanying figures where there is now about a 95% chance of success. As a bonus the median fortune has risen to $3.7M but that is not the main point.

XYZ Incorporated (your firm name goes here)

Report for: *April 23, 2010*

Client: *Demo*

Case: *Remedy*

Summary of Portfolio Value at Target Year 2060

Your Wealth Distribution has these characteristics:

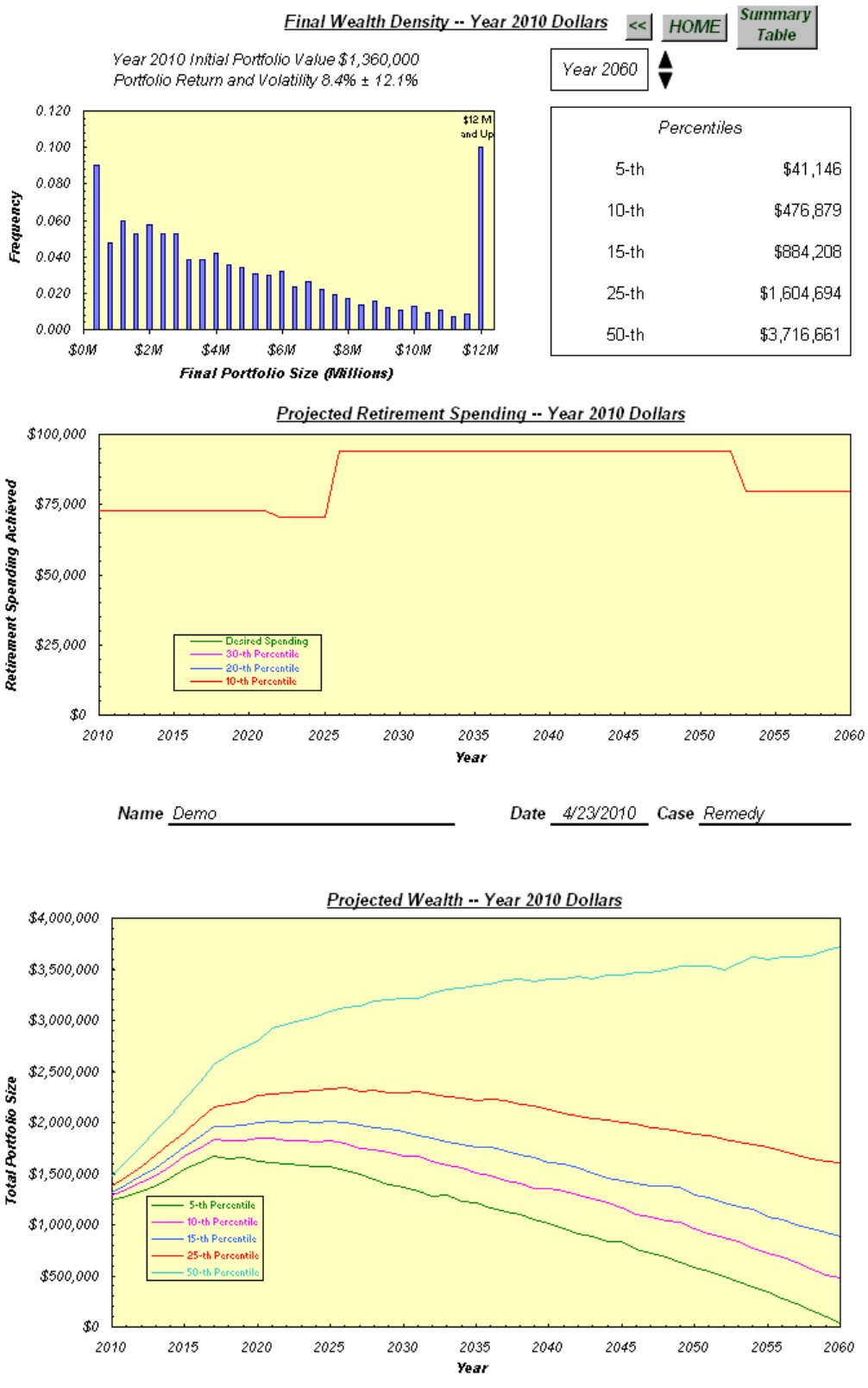
5%	chance of completely exhausting your portfolio	
85%	chance of having more than	$884,208
15%	chance of having less than	$884,208
75%	chance of having more than	$1,604,694
25%	chance of having less than	$1,604,694
50%	chance of having more than	$3,716,661
50%	chance of having less than	$3,716,661

Portfolio Sensitivity at 2060 -- Chance of Having Selected Target Amounts, by Notional Portfolios

	(NOW,NOW)	*(A,E)*	*(B,F)*	*(C,G)*	*(D,H)*	*(E,I)*	*(F,J)*
$250,000	0.93	0.94	0.93	0.93	0.90	0.85	0.73
$500,000	0.90	0.92	0.91	0.89	0.85	0.77	0.59
$750,000	0.87	0.90	0.88	0.85	0.80	0.68	0.47

Spending Sensitivity at 2060 -- Chance of Having Selected Target Amounts, by Adjusted Spending Schedule

	15 % Decrease	*10 % Decrease*	*5 % Decrease*	*Original Plan*	*5 % Increase*	*10 % Increase*	*15 % Increase*
$250,000	0.99	0.98	0.96	0.93	0.89	0.84	0.79
$500,000	0.98	0.96	0.93	0.90	0.86	0.80	0.75
$750,000	0.96	0.94	0.90	0.87	0.82	0.76	0.72



Check our website regularly for updates to the manual.