Is Conventional Financial Planning Good for Your Financial Health?

by

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Abstract

Economics teaches us that we save, insure, and diversify in order to mitigate fluctuations in our living standards over time and across contingencies. While the goals of conventional financial planning appear consonant with such *consumption smoothing*, the actual practice of conventional planning is anything but. Conventional planning's disconnect with economics begins with its first step, namely forcing households to set their own retirement- and survivor-spending targets. Setting spending targets that are consistent with consumption smoothing is incredibly difficult, making large targeting mistakes almost inevitable. But, as shown here, even small targeting mistakes, on the order of 10 percent, can lead to enormous mistakes in recommended saving and insurance levels and to major disruptions (on the order of 30 percent) in living standards in retirement or widow(er)hood.

There are three reasons why small targeting mistakes lead to such bad saving and insurance advice and such large consumption disruptions? First, the wrong targeted spending level is being assigned to each and every year of retirement and widow(er)hood. Second, planning to spend too much (little) in retirement and widow(er)hood requires spending too little (much) before those states are reached. This magnifies the living standard differences. Third, saving and insuring the wrong amounts affects tax and insurance premium payments, further exacerbating consumption disruption.

Conventional planning's use of spending targets also distorts its portfolio advice. Given a household's spending target and its portfolio mix, standard practice entails running Monte Carlo simulations to determine the household's probability of running out of money. These simulations assume that households make no adjustment whatsoever to their spending regardless of how well or how poorly they do on their investments. But consumption smoothing dictates such adjustments and, indeed, precludes running out of money; i.e., ending up with literally zero consumption. It is precisely the range of these living standard adjustments that households need to understand to assess their portfolio risk. Conventional portfolio analysis not only answers the wrong question; it may also improperly encourage risk-taking since riskier investments may entail a lower chance of financial exhaustion thanks to their higher mean.

In addition to exposing the general and generally serious shortcomings of targeting spending, this paper examines the retirement-spending targeting advice provided by the four web calculators of four major financial institutions – Fidelity, American Funds, Vanguard (which uses Financial Engines), and TIAA-CREF. Their advice is remarkably simple, geared, as it is, to speed households through the planning process in a matter of minutes. But quick and simple doesn't necessarily spell helpful. In the case of this paper's stylized household, the "advice" of the four companies leads to dramatic oversaving thanks to retirement-spending targeting mistakes ranging from 36 percent too high to 78 percent too high!

The paper also examines TIAA-CREF's and Fidelity's life insurance calculators. Like the retirement saving calculators, these calculators omit variables that are crucial for consumption smoothing. TIAA-CREF's calculators (there are two) recommend life insurance holdings far above the stylized household's actual needs. Fidelity's calculator also recommends far too much life insurance, but only for the wife. For the husband it recommends far too little.

I. Introduction

Economic theory predicts and casual observation confirms that households seek to maintain their living standards (smooth their consumption) as they age and face life's various contingencies. Seeking a stable living standard and actually achieving one are, however, two different things. We can't insure against aggregate shocks, including economic downturns, natural disasters, and epidemics. Nor can we buy actuarially fair insurance against a range of individual shocks, such as job loss, excessive longevity, and disability. And as we generally lack the self control to save and insure adequately even given attractive opportunities to do so.

These concerns with consumption smoothing are well known and have been amply studied.[1] But a fourth problem, namely the computation challenge posed by consumption smoothing, has received little attention. This is surprising since consumption mistakes could well swamp these other considerations. Certainly the calculations required to minimize consumption disruptions over time and across states of nature are highly complex. Just consider the number and range of current and future variables involved in consumption smoothing. The list includes household demographics, labor earnings, retirement dates, federal, state, and local taxes, Social Security benefits, pension benefits, regular and retirement assets, borrowing constraints, retirement account contributions and withdrawals, home ownership, mortgage finance, economies in shared living, the relative costs of children, changes in housing, choice of where to live, the financing of college and weddings, paying for one's dream boat, … And each of these variables demands consideration under each and every survival contingency.[2]

Taxation by itself is a factor worthy of a Xeon processor. Figuring out our federal and state taxes when both spouses are alive and in each future survivor state (years in which one spouse is deceased) requires determining whether we'll itemize our deductions, whether we'll receive any of many potentially available tax credits, whether we'll have to pay the Alternative Minimum Tax, whether we'll pay taxes on our Social Security benefits, whether we'll be contributing to or withdrawing from retirement accounts, and whether we'll be in high or low tax brackets. As if this list weren't bad enough, determining future taxes introduces a nasty simultaneity problem. We can't figure out our future taxes until we know our current spending (which determines, in part, our future taxable capital income); but we can't figure out our current spending without knowing our future taxes (which determines, in part, what we have available to spend).

Computing Social Security benefits is another nightmare. With 2528 separate rules in Social Security's Handbook, figuring out what retirement, dependent, survivor, divorcee, mother, father, and child benefits we'll receive can be maddening particularly in light of the system's complex average indexed monthly wage and primary insurance amount benefit formulae as well as its ancillary adjustments to the primary insurance amount. These adjustments include the earnings test, the early retirement reduction factors, the delayed retirement credit, the re-computation of benefits, the family benefit maximum, the windfall elimination and offset

[1] As an example, see http://post.economics.harvard.edu/faculty/laibson/papers.html for a long list of excellent papers by David Laibson and his colleagues contributing to the field of behavioral finance.

[2] Survival contingencies are distinguished both by which spouse/partner dies and when he/she dies. The reason is that the survivor will inherit different amounts of wealth, collect different amounts of life insurance, and receive different levels of Social Security survivor and retirement benefits depending on the age at which his/her spouse/partner dies.

formulae for workers with non-covered employment, and the phase-in to the system's ultimate age-67 normal retirement age.[3] How many households can even list all these interrelated factors, let alone process them accurately?

The standard fallback in economics is that households don't need to know all the details or have PhDs in math to make correct life-cycle decisions. Indeed, we economists view the mathematical formulation of optimal intertemporal choice as simply descriptive modeling. "Households," we tell ourselves, "don't do the math, but act *as if* they do. Yes, households will make mistakes, but these mistakes will be small and average out."

Unfortunately, studies of saving and insurance adequacy and portfolio diversification, including Kotlikoff, Spivak, and Summers (1982), Auerbach and Kotlikoff (1987, 1991) Bernheim, Carman, Gokhale, and Kotlikoff (2003), Bernheim, Forni, Gokhale, and Kotlikoff (2000, 2003), and Bernheim, Berstein, Gokhale, and Kotlikoff (2006), belie this proposition. Vast numbers of households save, insure, and avoid risk either far too much or far too little. The fact that households make both types of mistakes and that, as a consequence, generate *average* behavior that, on its face, is not extreme offers little professional consolation. The medical community wouldn't declare a cure for heart disease if half our hearts beat too fast and the other half beat too slow.

The other professional fallback is that households that look financially sick are, in fact, financially healthy, but simply have unusual preferences or prior beliefs about future events. Thus, a household that invests only in cash can be viewed as being extremely risk averse and also convinced that deflation is around the corner. Since preferences and priors are taken as economic primitives that are above reproach, there is no scientific basis for classifying extreme financial behavior as financial pathology. Imagine the medical profession declaring cancer a perfectly healthy manifestation of genetic free will.

Perhaps it's time to identify financial disease according to the financial pain it engenders. Based on this criterion, we are, generically speaking, financially quite sick. Indeed, the ravages of financial pathology are clearly seen among today's elderly, a full third of whom are wholly dependent or almost wholly dependent on Social Security.

Many households seek to cure their financial ills by turning to the financial planning industry for advice. In so doing, they effectively let financial planners or financial planning software do their *as if* expected utility maximization. For such households, the study of their financial behavior may simply boil down to understanding what planners or software they are using and what these planners or programs are leading them to do.

[3] Unfortunately, the Handbook is remarkably uninformative about many details of these adjustments, particularly the order in which they are applied. There are several old timers knocking about Social Security's Office of the Actuary who know these details, but when they go, this information may literally disappear. You might think that the computer code generating the hundreds of billions of dollars worth of actual Social Security's benefit payments would be easy to check on such matters. But this code is, as I've been told, very poorly documented and written in an ancient computer language, namely Cobol, that no one at Social Security understands.

Now if conventional financial planning corresponds closely to what economics prescribes, households taking this advice will improve their financial health. But what if conventional financial planning generates recommendations that are far a-field from proper consumption smoothing? In this case, "financial planning" will represent a cure-all, not real penicillin, and potentially leave one in worse financial shape.

In this paper I examine one aspect of conventional financial planning, namely the requirement that households set their own retirement and survivor spending targets. I show that from the perspective of consumption smoothing (the goal of achieving a stable living standard) even small targeting mistakes, on the order of 10 percent, can lead to enormous mistakes in recommended saving and insurance levels and major living standard disruptions (on the order of 30 percent) at retirement. Given the computational difficulties involved in achieving proper consumption smoothing on one's own, targeting mistakes of 10 percent or greater appear inevitable.

In soliciting spending targets, the traditional approach asks households to tally up all their current expenditures and to use this level of spending as a target for retirement and survivor spending with some adjustment for changes in spending needs. The goal here seems to be that of consumption smoothing, i.e., to achieve the same living standard before and after retirement and in survivor states.

The rub, however, is that the current level of spending, which underlies the targeting, may be higher or lower than the sustainable level. Given the computation problems referenced above, this is almost inevitable. Now if current spending is higher than the sustainable level, the targets will be set too high. In this case, households will be told to save and insure more than is consistent with consumption smoothing. If current spending is lower than the sustainable level, the targets will be set too low. In this case households will be advised to save and insure less than is consistent with consumption smoothing.

If the target is set too high, the household will be told to oversave and overinsure and will end up with a lower living standard prior to retirement and a higher one after retirement and in survivor states. If the target is set too low, the household will be told to undersave and underinsure and will end up with a higher living standard prior to retirement and a lower one after retirement and in survivor states. Both types of targeting mistakes will lead to consumption disruption, rather than consumption smoothing.

This depends, of course, on whether the household takes the advice being given. Telling households that are currently over-spending to substantially cut their current living standard may lead them to ignore the advice, decide to retire later, or accept a much lower future living standard. And telling households who are currently under-spending to start spending at what they perceive as crazy rates may lead them to discount financial planning altogether.

Why can small targeting mistakes lead to such bad financial advice and such large disruptions in living standard when the household retires or loses a head or spouse/partner? First, in the case of retirement, the targeting mistake is being made for roughly 30 years – from roughly age 65 to roughly age 95. In the case of survivorship, the targeting mistake is being made for all of the survivor's potential remaining years. Second, spending more (less) than one should in retirement

and survivor states means spending less (more) than one should prior to retirement in states when no one is deceased. This magnifies the living standard disruption (gap) beyond the original targeting mistake. Finally, the over-saving (under-saving) and over-insuring (under-insuring) associated with targeting for too high (low) living standards leads to higher (lower) taxes and insurance premium payments than would otherwise be paid. This induces further cuts (increases) in the pre-retirement living standard than would otherwise arise.

Targeted spending also underlies and undermines conventional financial planning's portfolio advice, potentially leading households to take on much more investment risk than is prudent. What households need to assess, in considering risky investments, is the variability of their future living standards. But standard planning assumes households will spend precisely their targeted amounts year after year regardless of the returns they receive unless and until they run out of money. This focuses attention on the probability of the plan (i.e., the target) working rather than on the spending consequences of it not. Since riskier investing can raise the probability of a plan's "success," households may be encouraged to take more risk than is appropriate. They may also get the idea that adjusting their portfolios rather than their lifestyle is the prudent response to low returns.

The paper proceeds in section II by discussing the method used to investigate the implication of targeting mistakes. Section III illustrates the problem of mis-targeted spending for a stylized middle-aged household. Section IV considers the targeting advice of four prominent financial institutions -- Fidelity Investments, Vanguard (which uses a product called *Financial Engines*), American Funds, and TIAA-CREF. As demonstrated, were this paper's stylized household to take this advice, its spending-target mistake would range from 36 percent too high to 78 percent too high, leading it to save wildly more than is appropriate! Section IV also examines the life insurance recommendations for the stylized household of TIAA-CREF and Fidelity. TIAA-CREF's calculators (there are two) recommend life insurance holdings far above the stylized household's actual needs. Fidelity's calculator also recommends far too much life insurance, but only for the wife. For the husband it recommends far too little.

Section V examines the portfolio recommendations emanating from standard planning, pointing out the potential encouragement of excessive risk taking. Section VI concludes by pointing out the need to use dynamic programming to a) determine saving and insurance recommendations consistent with consumption smoothing and b) evaluate the living standard risks of different investment strategies.

Before proceeding, let me issue a disclosure. My analysis below of the saving and insurance implications of small targeting mistakes uses *ESPlanner*^{TM}, a commercially available financial planning tool that I co-developed with Jagadeesh Gokhale. Unlike conventional software, *ESPlanner* uses dynamic programming to smooth households' living standards subject to borrowing constraints. As part of these calculations the program determines the annual levels of saving and life insurance holdings needed to preserve the household's living standard through time and across survival states. *ESPlanner* also uses dynamic programming to show how different time-dated investment strategies affect the variability of a household's living standard each year through its maximum year of life.

Although *ESPlanner* implements consumption smoothing (given specified inputs, including future earnings and rates of return), it can also be run as a targeted spending program. Hence, in quantifying the impact of targeting mistakes, I don't compare *ESPlanner* directly with any particular traditional financial planning software program. Rather I use *ESPlanner* and only *ESPlanner* to compare consumption smoothing to targeted spending. Since there is a unique solution to the consumption smoothing problems considered here, *ESPlanner* should be viewed as simply a tool to find that solution.[4] Stated differently, if one were to construct another consumption-smoothing algorithm that could handle all the inputs considered by *ESPlanner*, that alternative algorithm would find the same solution.

How can one check that *ESPlanner* is actually smoothing consumption? The answer is by looking at its reports. If the household is not borrowing constrained, *ESPlanner's* recommendations will show the same living standard per equivalent adult in each year that either the household head or spouse/partner are alive and, if recommended life insurance for decedents is positive, in each survivor state.[5] The reports also show that no resources are being left on the table; i.e., the household dies broke if the head, her spouse/partner, or both make(s) it to their maximum ages of life. Finally, the reports show that all user inputs (e.g., housing expenses) are being considered by the program in its consumption smoothing. Indeed, the only output in *ESPlanner's* reports, apart from its recommendations, that do not directly reflect user inputs are *ESPlanner's* calculations of calculation of taxes and Social Security benefits. If these calculations are wrong, its recommendations will be wrong.[6] However, as indicated below, *ESPlanner* makes highly detailed calculations of federal income and payroll taxes, state income taxes, and Social Security benefits. Moreover, mistakes in these calculations would not necessary bias the comparison of consumption smoothing and mis-targeted spending.

II. Methodology

The default parameterization of *ESPlanner*^{TM} leads the program to perfectly smooth a household's living standard. But one can tell the program, via its standard of living index, to generate any living standard pattern over the life cycle that one likes.[7] The program also has a survivor living standard preference parameter that lets one specify whether one wants survivors

[4] Given the non-linearity of taxes, the possibility of multiple consumption-smoothing solutions (with both low and high levels of lifetime consumption exhausting resources because the former engenders high lifetime taxes, thanks to high asset income, and that later low lifetime taxes, thanks to low asset income) cannot be ruled out a-priori. However, in tens of thousands of runs of *ESPlanner*, we have never encountered multiple solutions.

[5] If the household is borrowing constrained, one can see from visual inspection that *ESPlanner* is smoothing the household's living standard within each constrained interval and also across intervals in so far as living standard increases are as small as possible. *ESPlanner* incorporates non-negativity constraints on life insurance precluding the automatic recommendation of annuities (since negative holdings of life insurance is equivalent to positive holdings of annuities). When *ESPlanner* recommends zero life insurance for a potential decedent it's because the surviving spouse will have a higher living standard if the potential decedent actually dies. Visual inspection of the program's survivor reports will confirm this property of the program.

[6] Mistakes in *ESPlanner's* tax and Social Security benefit calculations would not, however, necessarily bias the comparison of consumption-smoothing and targeted saving since only *ESPlanner* is being used to make this comparison.

[7] This statement abstracts from binding borrowing constraints. If borrowing constraints bind, a household's spending and underlying living standard per equivalent adult will be constrained to avoid exceeding the user-inputted value for maximum indebtedness (apart from mortgage debt).

to have the same, a higher, or a lower living standard than the household has if neither the household head nor her/his spouse/partner die before their respective maximum ages of death.

To understand the implications of targeting mistakes, I first run *ESPlanner* leaving its standard of living index at 100 for all years. Given the stylized household's inputs, this run generates no binding borrowing constraints. Hence, in this base case the program produces a perfectly smooth (constant) living standard per year per equivalent adult when both spouses are alive and in all survivor states. The saving, consumption, and insurance recommendations from this calculation are referenced as the *consumption smoothing* (CS) results.

I then generate a set of *mis-targeted spending* results by running ESPlanner again, but with a different set of inputs for the standard of living index (SOLI) and the survivor living standard preference parameter (SLSPP). Specifically, I specify values for the SOLI in all retirement years and for the SLSPP such that *ESPlanner* generates 10 percent higher or lower levels of spending in retirement and in survivor states than it does in the base case. Thus, I'm treating the base case as generating the correct target for retirement and survivor state spending and using 1.1 times or .9 times this spending as the mistaken targets in my mis-targeted spending runs of *ESPlanner*.

ESPlanner's Inputs

As indicated, *ESPlanner* uses dynamic programming to solve the household's consumption smoothing problem. The basic program assumes that future earnings and expenditures will occur with certainty.[8] In addition to the SOLI and SLSPP, the program includes the following user-specified inputs: the household's state of residence, current and future planned children and their years of birth, current and future regular and self-employment earnings, current and future special expenditures and receipts (as well as their tax status), current and future levels of a reserve fund, current regular and retirement account balances, current and future own and employer contributions to retirement accounts (with Roth IRAs treated separately), current and future primary and vacation home values, mortgages, rental expenses, and other housing expenditures, current and future states of residence, ages of retirement account withdrawals, ages of initial Social Security benefit receipt, past and future covered Social Security earnings, desired funeral expenses and bequests, current regular saving and life insurance holdings, the economies of shared living, the relative cost of children, the extent of future changes in Social Security benefits, the extent of future changes in federal income taxes, FICA taxes, and state income taxes, current and future pension and annuities (including lump sum and survivor benefits), the degree to which the household will annuitize its retirement account assets, and values of future earnings, special expenditures, receipts, and other variables in survivor states in which either the head or her spouse/partner is deceased.

ESPlanner's Tax and Benefit Calculations

ESPlanner makes highly detailed federal income, FICA, and state-specific income tax as well as Social Security benefit calculations. The federal and state income-tax calculators determine

[8] *ESPlannerPlus*^{TM} does dynamic stochastic programming and uses Monte Carlo simulations to show the variability of households' living standards given their current and planned future portfolio allocations of regular and retirement account assets.

whether the household should itemize its deductions, compute deductions and exemptions, deduct from taxable income contributions to tax-deferred retirement accounts, include in taxable income withdrawals from such accounts as well as the taxable component of Social Security benefits, check (in the case of federal income taxes) for Alternative Minimum Tax liability, and calculate total tax liabilities after all applicable refundable and non-refundable tax credits.

These calculations are made separately for each year that the couple is alive as well as for each year a survivor may be alive. Moreover, *ESPlanner's* survivor tax and benefit calculations for surviving wives (husbands) are made separately for each possible date of death of the husband (wife). I.e., *ESPlanner* considers separately each date the husband (wife) might die and calculates the taxes and benefits a surviving wife (husband) and her (his) children would receive each year thereafter. Moreover, in calculating survivor-state specific retirement, survivor, mother, father, and child dependent and survivor Social Security benefits, *ESPlanner* takes account of all the above mentioned benefit adjustment factors.

ESPlanner's Algorithm

ESPlanner's calculates time-paths of consumption expenditure, taxable saving, and term life insurance holdings in constant (2001) dollars. Consumption in this context is everything the household gets to spend after paying for its "off-the-top" expenditures – its housing expenses, special expenditures, life insurance premiums, special bequests, taxes, and net contributions to tax-favored accounts. Given the household's demographic information, preferences, borrowing constraints, and non-negativity constraints on life insurance, *ESPlanner* calculates the highest sustainable and smoothest possible living standard over time, leaving the household with zero terminal assets (apart from the equity in homes that the user has chosen not to sell) if either the household head, her spouse/partner, or both live to their maximum ages of life.

The amount of recommended consumption expenditures needed to achieve a given living standard varies from year to year in response to changes in the household's composition. It also rises when the household moves from a situation of being liquidity constrained to one of being unconstrained. Finally, as mentioned, recommended household consumption will change over time if users intentionally specify, via the program's standard of living index, that they want their living standard to change.

The simultaneity issue with respect to taxes mentioned above is just one of two such issues that need to be considered. The second is the joint determination of life insurance holdings of potential decedents and survivors. *ESPlanner* recognizes that widows and widowers may need to hold life insurance in order to protect their children's living standard through adulthood and to cover bequests, funeral expenses, and debts (including mortgages) that exceed the survivor's net worth inclusive of the equity on her/his house. Accordingly, the software calculates these life insurance requirements and reports them in its survivor reports.

However, the more life insurance is purchased by the potential decedent, the less life insurance survivors will need to purchase, assuming they have such a need. But this means survivors will pay less in life insurance premiums and have less need for insurance protection from their decedent spouse/partner. Hence, one can't determine the potential decedent's life insurance

holdings until one determines the survivor's holdings. But one can't determine the survivor's holdings until one determines the decedent's holdings.

Dealing with the tax and life insurance simultaneity issues as well as the borrowing and non-negative life insurance constraints all within a single dynamic program seems well beyond the computing power of a desktop PC, particularly given the speed required for a commercial product. To overcome this problem, we developed a new method of dynamic program, which we dub *iterative dynamic programming*.[9] Specifically, we created two dynamic programs that pass data to one another on an iterative basis until they both converge to a single mutually consistent solution to many decimal points of accuracy.

One program takes age-specific life insurance premium payments as given and calculates the household's consumption smoothing conditional on these payments. The other program takes the output of this consumption smoothing program -- the living standard in each year that needs to be protected – as given. This second program calculates how much life insurance is needed by both potential decedents and their surviving spouses/partners. This iterative procedure allows us to also deal with our two simultaneity issues. The trick here is to form initial guesses of future taxes and survivor life insurance holdings and update these guesses across successive iterations based on values of these variables endogenously generated by the program in the previous iteration. When the program concludes its calculations, current spending is fully consistent with future taxes and vice versa, and the recommended life insurance holdings of heads and spouses/partners are fully consistent with the recommended life insurance holdings of survivors.

Developing the current version of *ESPlanner* took over a decade. The difficulty, time, and luck required to solve this simultaneous consumption-smoothing, borrowing constrained, saving, life insurance, and tax problem may explain why financial planning software producers have universally adopted the computationally trivial targeted-spending approach. As indicated, this approach puts the onus on the household heads and spouses/partners of doing literally millions of complex calculations in their heads in order to set their targets appropriately. Since none of us has computer chips implanted in his/her brain, let alone the right neuronware, the chance of making at least small targeting mistakes is extremely high. It is to the consequences of "minor" targeting mistakes that I now turn.

III. Consumption Smoothing versus Mis-Targeted Spending

In this section I discuss the case of a stylized middle aged, middle class married household with two children. Both spouses are age 40 in 2005. One child is age 10, and one is age 7. The couple lives in California. The husband earns $75,000 per year and the wife $50,000. Neither spouse has a retirement account, but the couple does have $75,000 in regular assets. The couple owns a $300,000 home with a $125,000 20-year mortgage with monthly payments of $1,250. Property taxes, homeowners insurance, and maintenance total $6,000 per year. The couple plans to spend $25,000 in today's dollars on college tuition and other expenses for each child for four years. Each spouse will retire at age 65 and begin collecting Social Security benefits in that year. Past covered earnings for the husband (wife) were $37,500 ($25,000) in 1987 when he (she) was 22 and grew by 4 percent each year through 2004. The couple expects inflation to run at 3

[9] Economic Security Planning, Inc. was awarded a patent for this discovery.

percent annually and earn a 6 percent nominal rate of return on savings. The remaining inputs are the economies in shared living and the relative cost of children. I used *ESPlanner's* default values for these inputs. Hence, I assume that two can live as cheaply as 1.6 and that to provide the same living standard to a child as to an adult costs only 70 percent as much.

Consumption Smoothing

Table 1 shows *ESPlanner's* annual recommendations for selected years for the consumption smoothing case, in which SOLI and SLSPP are left at their default values. All values in these and other tables are in 2005 dollars. Note that the couple's living standard per equivalent adult, given in the last column, equals $31,337. This amount remains constant through 2060 when each spouse reaches age 95, assuming they both live that long. Recommended total consumption expenditure, on the other hand, initially equals $71,852, but declines in 2014 and again in 2017 as the two children reach age 19 and are assumed to leave the household. In 2017 and thereafter recommended total consumption expenditure equals $50,139. For 2005 *ESPlanner* recommends $484,947 and $128,554 in term life insurance holdings for the husband and wife, respectively. Over time, recommended holdings decline.

Table 2 details the couple's total spending, which includes consumption, special expenditures on college, life insurance premiums, and housing. Note that real housing expenditures (expenditures valued in 2005 dollars) decline over time as the assumed 3 percent rate of inflation reduces the purchasing power of nominal mortgage payments. Once the mortgage is fully paid off, housing expenses are $6,000 per year. These expenses comprise property taxes, maintenance, and homeowners insurance, all three of which remain fixed in real terms. Term life insurance premiums first rise and then fall as the household ages. This reflects the increase with age in premium per dollar of coverage as well as the decline over time in *ESPlanner's* recommended life insurance holdings.

Table 3 displays selected years of the couple's regular asset balance sheet. *ESPlanner* generates similar reports for survivors conditional on the date of death of the decedent spouse. These reports show four things. First, households never exceed their debt limit, which in this case is zero. Second, all assets and income are spent, i.e., the household dies broke if the head and spouse/partner make it to their maximum ages of life. Third, household's living standard per equivalent adult is smooth during any interval of years within which the household is not borrowing-constrained. Fourth, were consumption, and thus the living standard, increased in any year, the household would die in debt. This implies that the living standard is maximized.

Mis-Targeting Spending

Now suppose that in 2005 our stylized household is spending not $71,852 on consumption, but 10 percent more (less), namely $79,037 ($64,667). Further suppose that this household uses its current consumption to set its retirement and survivor consumption spending levels, but that in setting these targets it appropriately adjusts for changes in the household's demographic over time and across survivor states. In this case, the household will specify a retirement consumption target that is 10 percent greater (smaller) than $50,139 or $55,153 ($45,125). It

will also specify survivor consumption spending targets that are 10 percent higher (lower), on a year-by-year basis, than those generated in this consumption-smoothing run.

How will these targeting mistakes affect the household's living standard, consumption expenditure, saving, life insurance holdings, assets, and taxes over its life cycle? The answers are provided in tables 4 through 7. Let's start with the household's living standard shown in table 4. The fifth column, labeled CS for consumption-smoothing indicates that the household's living standard per equivalent adult is $31,337 each year. This is the amount of consumption spending a single adult would need to make to enjoy the same living standard as she/he enjoys living in the household.

Column four presents the household's living standard path if it over-targets retirement and survivor spending by 10 percent and is thus directed to over-save and over-insure. The result is a $26,289 living standard prior to retirement and a $34,439 living standard after retirement. The ratio of the later to the former amount is 1.31, indicating that the targeting mistake causes a 31 percent disruption in living standard at retirement. This is a huge discrepancy given the maintained assumption that the household seeks to smooth its living standard.

In the case the household under-targets retirement and survivor spending by 10 percent, it will spend more before retirement and less thereafter than in the consumption-smoothing case. But, as column 5 shows, the pre-retirement living standard for this household is not constant. Instead it rises from $32,673 to $39,109 due to the binding of the household's liquidity constraint – the assumed non-positive value of non-mortgage debt. After retirement, the household's living standard drops to $28,159. The ratio of $28,159 to $39,109 is .72, indicating that the household suffers a 28.0 percent reduction in its living standard with respect to its pre- and post-retirement spending. Again, we see a major disruption at retirement in the household's living standard due to mis-targeting.[10]

Since the overspending household was, by assumption, enjoying a 2005 living standard of $34,471 (10 percent higher than $31,337) when it visited its financial planner or used conventional financial planning software, it will be advised to cut its current living standard by 23.7 percent (1 - 26,289/34,471) to meet its target. The underspending household was enjoying a $28,203 living standard (10 percent lower than $31,337). Now it will be told to raise its spending by 15.8 percent (32,673/28,203 – 1). These are big adjustments. It's also ironic that the over-spending household is being led to under-spend, and the under-spending household is being led to over-spend.

Clearly adjusting upward is easier than adjusting downward. Hence, the underspending household is more likely than the overspending household to take the mistaken advice. Thus the household, which may be most concerned with maintaining its living standard in retirement, will be led by standard financial planning to experience a 28.0 percent drop in its living standard when it retires – precisely what it is trying so hard to avoid.

[10] A small, but growing body of research is examining living standard changes at retirement. Bernheim, Skinner, and Weinberg (2001), for example, provide evidence that living standards drop, on average, at retirement by 14 percent, with a median drop of 12 percent.

Of course, households could well be making targeting mistake from a situation of currently spending the correct amount. All they need do is make mistakes in adding up their current expenditures or miscalculate the appropriate demographic adjustments. I refer here to the adjustment for the absence of children in retirement or the absence of a spouse in widow(er)hood. Adjusting for this change in the number and sizes of mouths to feed requires thinking through economies in shared living and the relative cost of children. These are not easy considerations even for very well educated households. *ESPlanner* uses a non-linear function to determine its economies of shared living. Evaluating such a function would be hard for anyone to do in his head and impossible to do on paper without some real facility with algebra.[11]

If plus or minus 10 percent mistakes occur with equal likelihood, the spread in pre-retirement living standards for two otherwise identical households could easily be 48.8 percent – the difference in the $26,289 and $39,109 pre-retirement living standards of households that set their spending targets 10 percent too high and 10 percent too low, respectively. The corresponding post-retirement spread in living standards is 22.3 percent. For a source of age-specific consumption inequality, this seems like a good place to look.

Mistakes in Consumption, Saving, and Insurance Recommendations

Tables 5 and 6 report saving and life insurance recommendations for the three cases. The proportionate consumption differences across the cases are the same as those the living standard differences just discussed. Hence, I focus on saving and insurance recommendations. As one can quickly see, the differences here are tremendous. In 2005, for example, the plus 10 percent saving recommendation is $11,955 compared with - $810 in the minus 10 percent case. At age 60 the two saving recommendations are $38,818 and $19,711 respectively. At 75, they're -$13,891 and $4,240.

Life insurance recommendations in the plus and minus 10 percent cases are equally day and night. In 2005, the plus 10 percent targeting mistake leads to a recommendation of $814,600 in life insurance for the husband, whereas the minus 10 percent targeting mistake leads to a recommendation of only $106,436. Both of these values are very far away from $484,947 -- the desired consumption-smoothing amount. For the wife, the plus 10 percent mistake leads to a $460,405 term life insurance recommendation for 2005. In contrast, the minus 10 percent mistake leads to a recommendation of zero life insurance. The correct consumption-smoothing amount in this case is $128,554.[12] The dramatically higher level of life insurance in the plus 10 percent case entails dramatically higher life insurance premiums. For example, at age 50 the plus 10, CS, and minus 10 households pay premiums of $4,017, $2,288, and $497, respectively.

[11] *ESPlanner's* economies of shared living function relates the living standard per adult, L, the number of adults, N, the number of children, K, and the relative cost of children, m, to total consumption expenditure C via the following equation: $C = L(N + mK)^d$, where *d* is set, in the default case, such that $C/L = 1.6$, when $N = 2$ and $K = 0$; i.e., $d = \ln 1.6 / \ln 2 = .678$.

[12] In the plus 10 percent case, *ESPlanner* recommends that the couple hold life insurance, albeit relatively small amounts, very late in life. Given the economies in share living and the relatively high living standard to be insured, the loss of the one spouse's social security benefits over a significant number of years generates this small need for life insurance.

Table 7 shows equally wild disparities in assets and tax payments across the three cases. At retirement, the household with the plus 10 percent targeting mistake holds $498,580 in assets. This is 1.8 times the consumption-smoothing assets holdings of $277,309 and 3.4 times the $147,594 minus 10 percent holdings. Since higher assets levels imply higher taxable asset income, taxes are highest for the plus 10 percent household and lowest for the minus 10 percent household. At age 65, the high, middle, and low tax payments are $7,075, $4,737, and $2,640. As indicated, these discrepancies in tax and insurance premium payments exacerbate the consumption disruption at retirement and at widow(er)hood that arises from mis-targeting future retirement and survivor spending.

The Sensitivity of Consumption Disruption to Assumptions

Consumption disruption caused by mis-targeted spending is likely to be greater for older households since they have fewer years over which to adjust their pre-retirement spending to meet the goal of spending too much or too little in retirement. Households that are liquidity constrained are likely to set their spending targets too low since their current spending is limited by the availability of their liquid funds. If they retain these targets after their liquidity constraint is relaxed, they will, of course, be induced to undersave and underinsure for the future. Households earning low rates of return will experience larger consumption distruptions because larger adjustments to current spending will be needed to fund a given targeting mistake. Finally, households with higher maximum ages of life will face larger disruptions because one needs to fund targeting mistakes for more potential retirement and survivorship years.

IV. The Targeting Advice of Financial Institutions

One way to assess the potential for targeting mistakes is to consider the targeting advice being provided by financial institutions on their websites. Fidelity Investment's *Retirement Quick Check* calculator takes .595 percent of annual labor earnings as the household's expenditure target, exclusive of taxes. For the household considered here, this equals $74,375. Subtracting the stylized household's $6,000 in annual housing expenses leads to a target of $68,375 for discretionary spending. As table 1 indicates, the appropriate consumption target is $50,139. Relative to this target, Fidelity's target is 36.4 percent too high![13]

TIAA-CREF's web tool is called the *Retirement Goal Evaluator*. Unlike Fidelity's tools, the *Retirement Goal Evaluator* can be accessed by non-customers. A quick glance at this tool posted at https://www3.tiaa-cref.org/reteval/RetServlet indicates that TIAA-CREF is recommending a retirement "salary replacement" target equal to .80 percent of annual labor earnings. For our stylized household, this equals $100,000. TIAA-CREF doesn't specify the tax rate it thinks our couple will face in retirement, but if I subtract $4,737 – *ESPlanner's* age-65 tax bill in the consumption smoothing case as well as the couple's $6,000 in housing expenses, I arrive at a discretionary spending target of $89,263. This is 78.0 percent higher than the appropriate target!

[13] Fidelity's small print suggests *Retirement Quick Check* is most appropriate for those within four years of retirement. Fidelity also provide a more elaborate tool, its *Retirement Income Planner*, that allows one to enter future expenses one by one. When I spoke to a Fidelity representative about the *Retirement Income Planner*, I was, however, told that it was meant for retirees and the *Quick Check* tool was meant for workers. This is supported by the fact that the *Retirement Income Planner's* balance sheet display results only starting in the year of retirement.

American Funds is one of the three largest mutual funds in the county. Its free *Retirement Planning Calculator* also uses an 80 percent salary replacement target. Hence, when applied to our couple, it also sets a target that is 78.0 percent too high.

Vanguard, another huge financial institution, offers *Financial Engines*, developed by economics Nobel Laureate William Sharp, for free use by those with over $100,000 in invested assets. One can also pay $149.95 per year to use *Financial Engines*. I ran the program pretending to be the stylized household. *Financial Engines* recommends that one estimate pre-tax retirement income needs by multiplying pre-retirement income by .70. It justifies this by saying that "Many financial planners estimate that you'll need 60% - 80% of your pre-retirement household income to maintain your standard of living." There is no reference given as to which financial planners are being referenced, what basis these planners use for their estimate, what financial education these planners possess, or the extent to which these planners have a financial interest in forming their "estimates."

Be that as it may, let's take the mid-point of *Financial Engine's* range – 70 percent – as the target income-replacement rate. For our stylized household, 70 percent of pre-retirement labor income of $125,000 is $87,500. Like TIAA-CREF, *Financial Engines* doesn't specify the tax rate it thinks our couple will face in retirement, but if I subtract $4,737 – *ESPlanner's* age-65 tax bill in the consumption smoothing case as well as the couple's $6,000 in housing expenses, I arrive at a discretionary spending target of $76,763. This is 53.1 percent higher than the appropriate target![14]

To summarize, the four web calculators examined specified targets that were 36.4 percent too high, 53.1 percent too high, 78.0 percent too high, and 78.0 percent too high. All four based their targets on current labor income. For our stylized household, real labor income remains constant through retirement. But most households experience major fluctuations in their annual labor earnings. So using current income as a measure of average pre-retirement income is introducing tremendous noise in the targeting procedure. Moreover, even were current labor income constant, targeting on the basis of labor income completely ignores the household's regular and retirement account assets. If such assets are sizeable, they may be more important in determining the household's sustainable living standard and, thus, its appropriate target than labor earnings.

Many readers may react to this quick, non-random survey of targeting practices by saying that it's better to err on the high side because retirement expenses, income, and longevity are all highly uncertain. But, as just indicated, these targeting procedures could equally well err on the low side if current income is low relative to average income or if assets are sizeable. In addition, these calculators all assume fixed expenses, plan for a given length of life, and permit one to contemplate very safe investments (e.g., inflation indexed bonds). So they really do permit an

[14] I ignore here pre-retirement capital income, since this depends on what pre-retirement year one chooses. I also use tax payments at age 65, since they are the maximum paid in retirement. Were I to take pre-retirement income to mean total income at age 64 (which, for the stylized household, is $132,150) and use tax payments mid-way through retirement – at age 80 (which, for the stylized household is $3,705), the discretionary spending (excluding housing) target for the household would be $82,800 – a 64.8 percent, rather than a 52.7 percent, targeting mistake.

apples-to-apples comparison with the consumption-smoothing calculated by *ESPlanner*. Stated differently, if these calculators aren't meant to give precise guidance, but rather just an admonition that we need to save and insure, why are they generating precise recommendations?

Life Insurance Targets

What about life insurance targets? Of the four companies, both TIAA-CREF and Fidelity provide life insurance calculators on their websites. Actually, TIAA-CREF provides two calculators available to all site visitors. One is called the *Simple Life Insurance Needs Calculator*. The other is called the *Detailed Life Insurance Needs Calculator*. The *Simple Calculator* is, indeed, simple, containing only seven questions. The *Detailed Calculator* has 20 questions.

I ran both spouses of our stylized couple through both TIAA-CREF calculators. The key question posed by the two calculators is the amount of earnings of the potential decedent to be replaced and the number of years over which these earnings are to be replaced. In the *Simple Calculator* a hyperlink to the word *replaced* states "In general your family may need about 75% of your total family income to maintain its standard of living. This figure assumes your mortgage has been paid off. If it hasn't, you'll need to use a higher percentage." Since this household has a mortgage, I chose a replacement rate of 80 percent of the husband's $75,000 in earnings (i.e., $60,000) and of the wife's $50,000 in earnings (i.e., $40,000) and also specified 25 years as the number of years for which earners were to be replaced. As indicated in figure 1, I also entered $125,000 for the outstanding mortgage balance and $100,000 in college expenses. The *Simple Calculator's* recommended holdings for the husband and wife are $1.825 million and $1.325 million, respectively. These values are 3.8 times and 10.3 times the respective consumption-smoothing recommendations.

The "detailed" calculator's extra questions include the ages of the husband and wife, the ages of the children, the rate of inflation, and the nominal rate of return on investments. This calculator recommends $1.054 million in life insurance for the husband and $777,790 for the wife. These recommendations are 2.2 and 6.0 times the consumption smoothing values, respectively. In the consumption-smoothing case, the couple spends $983 in 2005 on life insurance premiums. If the couple were to follow TIAA-CREF's *Detailed Calculator's* recommendations, they'd pay close to $3,000 in premiums or 2.3 percent of their combined 2005 earnings. If the couple follows the *Simple Calculator's* advise, they'll end up spending over $5,000 or 4.0 percent of their labor earnings. This is a lot of money for the couple to spend on something it doesn't need.

The fact that TIAA-CREF provides two calculators is, in itself, noteworthy. There aren't really two answers to the question of how much life insurance a household needs. So if TIAA-CREF believes that $1.825 million is the right life insurance holdings for the husband in our stylized household, why does it offer its *Detailed Calculator*, which can lead the husband to dramatically underinsure by purchasing only $1.054 million in life insurance? Alternatively, if TIAA-CREF

believes that $1.054 million is the right coverage, why does it provide the *Simple Calculator* when can lead the husband to dramatically overinsure?

Another striking feature of TIAA-CREF's calculators is that both are focused on targeting retirement spending relative to the decedent spouse's earnings. Neither calculator asks about the surviving spouse's earnings. Nor do they account for Social Security survivor benefits, private pensions, or retirement accounts. If the goal is to preserve the living standard of survivors, these data are essential. Suppose, for example, that the wife made $1 million per year, rather than $50,000. In this case, the husband would have no need to buy life insurance to protect the wife. On the contrary, since the husband is basically living off the wife's earnings, his death would raise, not lower, his survivors' living standard and represent for them a fortuitous event, economically speaking.

Fidelity's 10-question life insurance calculator does ask about the surviving spouse's earnings. But it ignores the potential decedent's earnings, thereby abandoning any possibility of determining directly the household's sustainable living standard and appropriate survivor-spending target. Instead of asking how much of the potential decedent's earnings are to be replaced, Fidelity's calculator prompts users to enter 70 percent of current spending as the insurance target.

Figure 2 provides a screen shot of the inputs I used to determine Fidelity's recommended life insurance holdings for the husband. I entered 70 percent of the stylized household's 2005 CS total spending, including housing expenses and life insurance premiums. For survivor Social Security benefits I used the monthly survivor benefit generated for 2006 for the wife as reported in the wife's *ESPlanner's* survivor report. I also entered a 4.54 percent rate of return. I arrived at this input by starting with Fidelity's underlying 2.16 percent annual inflation assumption (specified under retirement planning on its website). To this rate I added in a 3 percent real return (consistent with *ESPlanner's* default assumption). Finally, I multiplied by .88, which assumes a 12 percent combined federal and state average tax rate – the rate generated by *ESPlanner* in the wife's survivor report. The other inputs include $200,000 for the children's college expenses, the household's current assets, the wife's monthly labor earnings, and the mortgage balance. I entered inputs for the husband in the same manner.

Fidelity's calculator recommends $250,000 in life insurance for both the husband and the wife. For the husband, $250,000 is far below the $484,947 needed according to consumption smoothing. For the wife $250,000 is far above the $128,554 needed.

V. Portfolio "Advice"

Conventional planning's use of spending targets also distorts its portfolio advice. Given the household's retirement spending target and portfolio mix, conventional planning runs Monte Carlo simulations that determine the household's probability of running out of money. These simulations assume that households make no adjustment whatsoever to their spending as a result of doing well or poorly on their investments. But consumption smoothing dictates such adjustments and precludes running out of money; i.e., ending up with literally zero consumption. It is precisely the range of these living standard adjustments that households need to understand

to assess their portfolio's risk. Conventional portfolio analysis not only answers the wrong question; it may also improperly solicit risk-taking since riskier investments may entail a lower chance of financial exhaustion thanks to their higher mean.

To see this point in its starkest form take, as an example, a single 60-year old named Joe, whose only economic resource is $500,000 in assets. Assume Joe's maximum age of life is 95 and that he faces no taxes of any kind. Suppose Joe sets his spending target at $30,000 per year. Also assume that Joe holds only TIPs – Treasury inflation-protected (inflation-indexed) bonds – yielding 2 percent after inflation. These bonds are essentially riskless and permit Joe to consume, at most and at least, $20,413 in today's dollars each year. What's Joe's probability of meeting his target - $30,000 – each year? It's zero, of course since spending $30,000 will drive Joe broke unless he fortuitously dies beforehand.

Now suppose that Joe were to invest in large cap stocks rather than in TIPs? Since 1926 the real return on large caps has averaged 9.16 percent on an annual basis.[15] Were Joe able to earn this return for sure, he'd be able to spend $48,264 per year. But large cap stocks are risky. The ratio of the variance of the large cap return to its mean is .42. Nonetheless, there's still a good chance, indeed a 33 percent chance, that Joe will be able to spend $30,000 per year. So if Joe uses a standard Monte Carlo portfolio analyzer he'll find that investing in TIPs fails completely to meet his goal, but that investing in stocks will meet his goal two thirds of the time. Joe may view this as a pretty good bet given the way this investment outcome information is being presented.

Suppose then that Joe invests all his assets in large caps and then experiences in the next three years the large cap returns recorded in 1999, 2000, and 2001, namely -12.1 percent, -13.2 percent, and -23.9 percent. Will Joe continue to spend $30,000 per year and remain in the stock market given that his wealth after three years has dropped from $500,000 to $217,583? Probably not. At that point, Joe may well switch to holdings just TIPs and be forced to live from that point on at only $9,469 per year. In not showing such large and sudden adverse potential living standard adjustments, standard financial planning seems to be encouraging more risk taking than is appropriate. This concern is heightened by the prospect of many households being induced as part of the same planning exercise to set their future spending targets at higher levels than is appropriate.

VI. Conclusion

Purveyors of financial advice have an ethical, if not a fiduciary responsibility to ensure that the advice they provide is sound. Unfortunately, the prevailing view seems to be that any advice is better than no advice. Thus we see TIAA-CREF and Fidelity providing both "quick" advice as well as "detailed" advice. TIAA-CREF and Fidelity apparently believes that answering seven to ten questions in the course of 60 seconds about your life insurance needs is adequate time to devote to protecting one's spouse and children. Not so. Financially protecting one's family is very serious business that requires careful analysis and a real commitment of time. It also

[15] This is the average of annual real returns rather than the geometric mean. The data source is *Ibbotson's 2005 Year Book*.

requires posing and correctly answering the right question, namely how can I preserve my family's living standard through time and in unforeseen, but not unforeseeable, circumstances.

Maximizing and preserving one's living standard is the hallmark of consumption smoothing -- the economic approach to financial planning. Although conventional financial planning attempts to achieve consumption smoothing by having households set targets based on their current spending, this practice, as we've seen, is essentially guaranteed to provide very bad saving, insurance, and investment advice and promote consumption disruption rather than consumption smoothing.

What about using the conventional planning methodology, but adjusting one's spending target to equalize living standards across one's working life, retirement, and widow(er)hood? Such target practice can, in theory, work. But doing so for any given set of assumptions could take hours, not seconds. The reason is that many, if not most, households are borrowing constrained, meaning that they or their financial planner would need to simultaneously set and adjust spending targets for each borrowing-constrained interval.[16] When one adds to this picture return uncertainty, we're no longer talking hours, but weeks. The reason is that one needs to solve not for one spending path, but for all possible, and potentially borrowing-constrained, spending paths that would arise under each path of return realizations.

The only practical way to handle these problems mathematically is via dynamic programming, developed in the early 1950s by Richard Bellman. Specifically, one formulates a general plan for consumption smoothing in the last period, which I'll call T. It then uses the period T plan to formulate a plan for the next to last period, i.e., T-1. The T-1 plan is used to formulate the T-2 plan, and so forth back to time the current time period, which I'll call 0. This time-0 plan is then used to determine how much to spend, save, and insure in the current year.

Although mathematicians, economists, and engineers are well versed in dynamic programming, the architects of traditional financial planning software are not. Or, if they are, they are constrained by their superiors to keep things simple, which, in this context, means failing to elicit much of the information, such as the path of future labor earnings, prospective changes in housing, and plans for retirement account withdrawals, needed to generate an accurate dynamic program.

In closing, let me make a final medical analogy. None of us would go to a doctor for a 60 second checkup. Nor would we elect surgery by meat cleaver over surgery with a scalpel. And any doctor who provided such services would be quickly drummed out of the medical profession. Financial planning, like brain surgery, is an extraordinarily precise business. Small mistakes and the wrong tools can just as easily undermine as improve financial health.

[16] Berheim, Berstein, and Kotlikoff (2002) found that roughly three fifths of Boston University participants in a study of saving and insurance adequacy were borrowing constrained.

Table 1
Consumption Smoothing Annual Recommendations

Year	H's Age	W's Age	Consumption	Saving	H's Life Insurance	W's Life Insurance	Living Standard Per Adult
2005	40	40	71,852	1,440	484,947	128,554	31,337
2006	41	41	71,852	1,678	479,364	131,024	31,337
2007	42	42	71,852	1,906	467,677	132,826	31,337
2008	43	43	71,852	2,117	452,332	135,409	31,337
2009	44	44	71,852	2,309	435,512	139,488	31,337
2010	45	45	71,852	2,458	425,461	144,822	31,337
2011	46	46	71,852	2,597	415,998	151,089	31,337
2012	47	47	71,852	2,701	407,888	158,198	31,337
2013	48	48	71,852	2,767	401,155	166,140	31,337
2014	49	49	61,455	(12,770)	388,883	169,766	31,337
2015	50	50	61,455	(12,895)	377,052	173,952	31,337
2016	51	51	61,455	(13,057)	365,666	178,683	31,337
2017	52	52	50,139	(27,760)	333,541	165,914	31,337
2018	53	53	50,139	(2,930)	301,025	152,962	31,337
2019	54	54	50,139	(2,849)	268,095	139,801	31,337
2020	55	55	50,139	(2,775)	234,700	126,405	31,337
2021	56	56	50,139	22,250	207,122	112,783	31,337
2022	57	57	50,139	22,525	179,143	98,908	31,337

Table 2
Consumption Smoothing Total Spending

Year	H's Age	W's Age	Consumption	Special Expenditures	Housing Expenditures	Life Insurance Premiums	Total Spending
2005	40	40	71,852	0	20,563	983	93,398
2006	41	41	71,852	0	20,139	1,093	93,084
2007	42	42	71,852	0	19,727	1,198	92,777
2008	43	43	71,852	0	19,327	1,302	92,481
2009	44	44	71,852	0	18,939	1,408	92,199
2010	45	45	71,852	0	18,562	1,538	91,952
2011	46	46	71,852	0	18,196	1,678	91,726
2012	47	47	71,852	0	17,841	1,831	91,524
2013	48	48	71,852	0	17,496	2,000	91,348
2014	49	49	61,455	25,000	17,161	2,140	105,756
2015	50	50	61,455	25,000	16,836	2,288	105,579
2016	51	51	61,455	25,000	16,521	2,445	105,421
2017	52	52	50,139	50,000	16,214	2,422	118,775
2018	53	53	50,139	25,000	15,917	2,373	93,429
2019	54	54	50,139	25,000	15,628	2,301	93,068
2020	55	55	50,139	25,000	15,348	2,203	92,690
2021	56	56	50,139	0	15,075	2,119	67,333
2022	57	57	50,139	0	14,811	2,008	66,958

Table 3
Consumption Smoothing Regular Asset Balance Sheet

Year	H's Age	W's Age	Income	Total Spending	Taxes	Saving	Regular Assets
2044	79	79	51,191	56,139	3,783	(8,732)	162,454
2045	80	80	50,937	56,139	3,686	(8,888)	153,566
2046	81	81	50,678	56,139	3,584	(9,045)	144,521
2047	82	82	50,415	56,139	3,479	(9,203)	135,317
2048	83	83	50,147	56,139	3,369	(9,362)	125,955
2049	84	84	49,874	56,139	3,257	(9,522)	116,433
2050	85	85	49,597	56,139	3,140	(9,683)	106,750
2051	86	86	49,314	56,139	3,020	(9,845)	96,905
2052	87	87	49,028	56,139	2,896	(10,007)	86,898
2053	88	88	48,736	56,139	2,768	(10,171)	76,727
2054	89	89	48,440	56,139	2,637	(10,336)	66,390
2055	90	90	48,139	56,158	2,502	(10,521)	55,869
2056	91	91	47,833	56,253	2,363	(10,784)	45,085
2057	92	92	47,518	56,338	2,219	(11,039)	34,046
2058	93	93	47,197	56,392	2,070	(11,266)	22,780
2059	94	94	46,869	56,368	1,917	(11,417)	11,363
2060	95	95	46,536	56,139	1,760	(11,363)	0

Table 4

Consumption and Saving Recommendations
-- Consumption Smoothing vs. Mis-Targeting

Year	Husband's Age	Wife's Age	Living Standard			Percentage Difference in Living Standard Relative to CS	
			+ 10%	CS	- 10%	+ 10%	- 10%
2005	40	40	26,289	31,337	32,673	-16.1%	4.3%
2010	45	45	26,289	31,337	32,673	-16.1%	4.3%
2015	50	50	26,289	31,337	32,673	-16.1%	4.3%
2020	55	55	26,289	31,337	32,673	-16.1%	4.3%
2025	60	60	26,289	31,337	39,109	-16.1%	24.8%
2030	65	65	34,439	31,337	28,159	9.9%	-10.1%
2035	70	70	34,439	31,337	28,159	9.9%	-10.1%
2040	75	75	34,439	31,337	28,159	9.9%	-10.1%
2050	80	80	34,439	31,337	28,159	9.9%	-10.1%
2055	85	85	34,439	31,337	28,159	9.9%	-10.1%
2060	90	90	34,439	31,337	28,159	9.9%	-10.1%
2065	95	95	34,439	31,337	28,159	9.9%	-10.1%

CS references consumption smoothing, + 10% references a 10% positive targeting mistake, - 10% references a 10% negative mistake.

Table 5

Consumption and Saving Recommendations
-- Consumption Smoothing vs. Mis-Targeting

Year	Husband's Age	Wife's Age	Recommended Consumption			Recommended Saving		
			+ 10%	CS	- 10%	+ 10%	CS	- 10%
2005	40	40	60,278	71,852	74,915	11,955	1,440	(810)
2010	45	45	60,278	71,852	74,915	13,146	2,458	520
2015	50	50	51,555	61,455	64,074	(3,619)	(12,895)	(13,923)
2020	55	55	42,062	50,139	52,276	4,798	(2,849)	(3,000)
2025	60	60	42,062	50,139	62,575	38,818	31,423	19,711
2030	65	65	55,102	50,139	45,054	(10,168)	(6,594)	(3,189)
2035	70	70	55,102	50,139	45,054	(11,894)	(7,350)	(3,719)
2040	75	75	55,102	50,139	45,264	(13,891)	(8,112)	(4,240)
2050	80	80	55,102	50,139	45,054	(16,083)	(8,888)	(4,758)
2055	85	85	55,102	50,139	45,054	(18,611)	(9,683)	(5,278)
2060	90	90	55,102	50,139	45,054	(21,356)	(10,521)	(5,805)
2065	95	95	55,102	50,139	45,054	(16,262)	(11,363)	(6,343)

CS references consumption smoothing, + 10% references a 10% positive targeting mistake, - 10% references a 10% negative mistake.

Table 6

Life Insurance Recommendations
-- Consumption Smoothing vs. Mis-Targeting

Year	Husband's Age	Wife's Age	Husband's Life Insurance			Wife's Life Insurance		
			+ 10%	CS	- 10%	+ 10%	CS	- 10%
2005	40	40	814,600	484,947	106,436	460,405	128,554	0
2010	45	45	690,432	425,461	112,015	414,861	144,822	0
2015	50	50	582,515	377,052	119,611	384,669	173,952	0
2020	55	55	399,515	234,700	9,982	296,195	126,405	0
2025	60	60	220,819	92,366	0	186,569	55,269	0
2030	65	65	63,139	0	0	85,191	0	0
2035	70	70	85,191	0	0	63,139	0	0
2040	75	75	45,822	0	0	45,822	0	0
2050	80	80	32,261	0	0	32,261	0	0
2055	85	85	22,807	0	0	22,807	0	0
2060	90	90	17,603	0	0	17,603	0	0
2065	95	95	0	0	0	0	0	0

CS references consumption smoothing, + 10% references a 10% positive targeting mistake, - 10% references a 10% negative mistake.

Table 7

Assets and Taxes
-- Consumption Smoothing vs. Mis-Targeting

Year	Husband's Age	Wife's Age	Assets			Taxes		
			+ 10%	CS	- 10%	+ 10%	CS	- 10%
2005	40	40	89,205	78,690	76,440	32,411	32,411	32,411
2010	45	45	152,732	89,159	76,548	34,100	33,114	32,916
2015	50	50	186,022	71,558	51,470	36,735	34,776	34,421
2020	55	55	176,192	22,188	0	38,540	35,812	35,403
2025	60	60	335,873	144,250	66,660	42,868	39,309	38,082
2030	65	65	488,412	270,715	144,405	7,078	4,737	2,640
2035	70	70	423,520	235,480	126,865	6,542	4,488	2,674
2040	75	75	367,143	196,448	106,706	5,914	4,136	2,623
2050	80	80	291,190	153,566	83,951	5,188	3,686	2,493
2055	85	85	203,311	106,750	58,602	4,442	3,140	2,290
2060	90	90	101,868	55,869	30,633	3,421	2,502	2,018
2065	95	95	0	0	0	1,839	1,760	1,679

CS references consumption smoothing, + 10% references a 10% positive targeting mistake, - 10% references a 10% negative mistake.

Figure 1

TIAA-CREF's Simple Life Insurance Needs Calculator

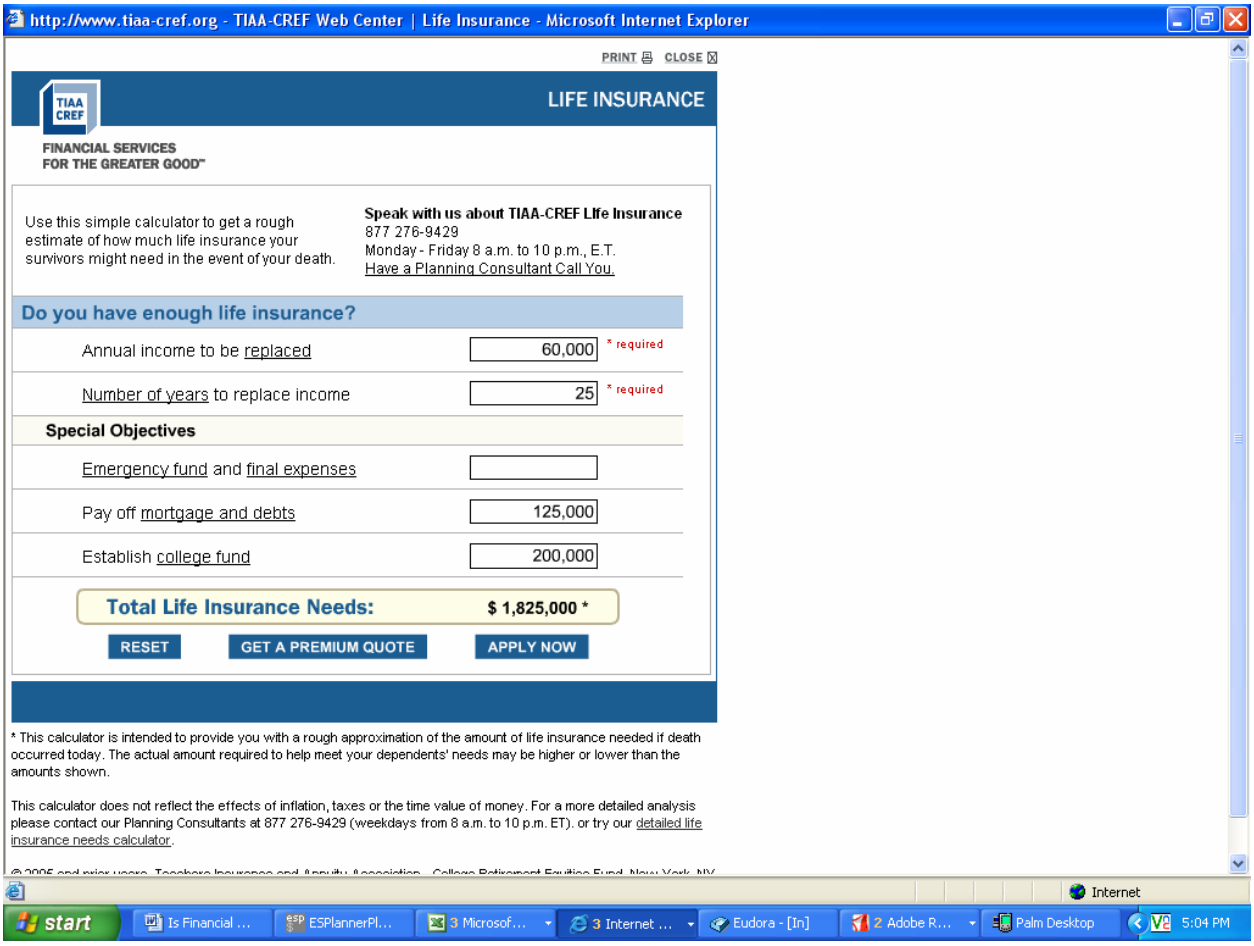
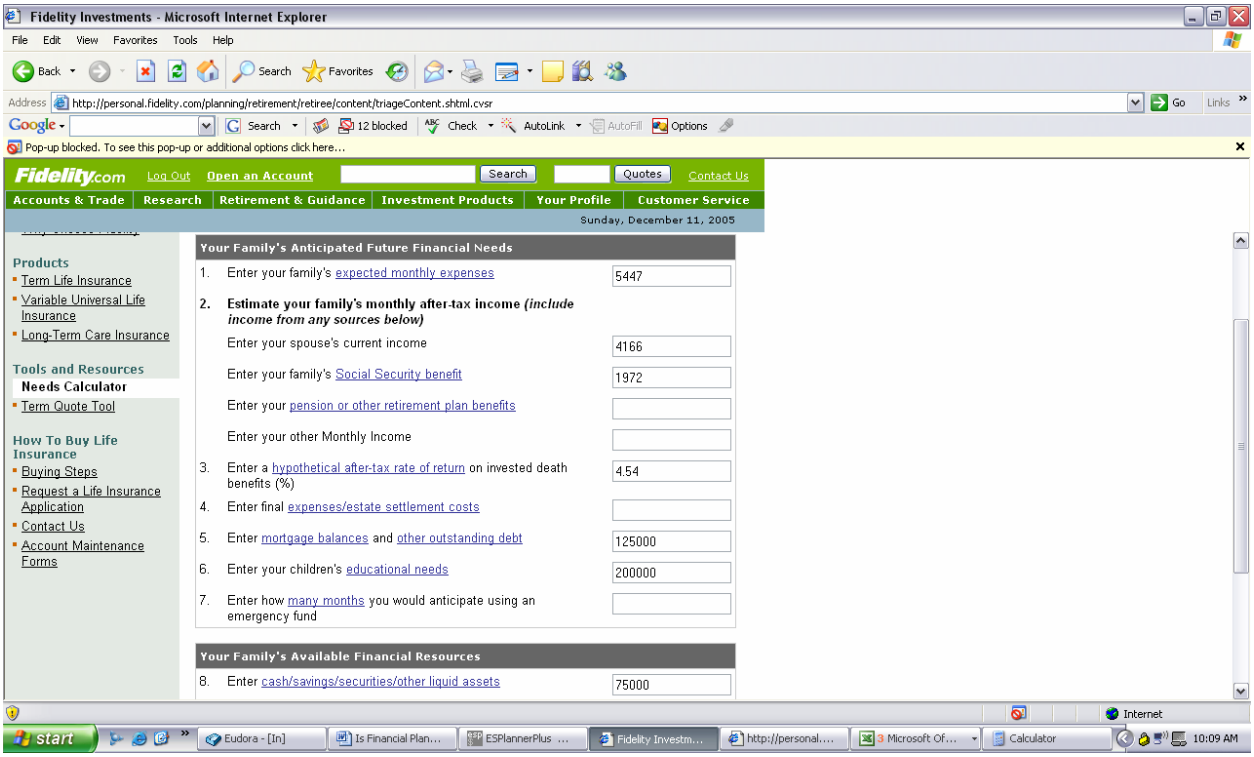


Figure 2

Fidelity's Life Insurance Calculator



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