1998

**How Prepared are Americans for Retirement?**

Mark J. Warshawsky

John Ameriks

Follow this and additional works at: [https://repository.upenn.edu/prc_papers](https://repository.upenn.edu/prc_papers)

Part of the Economics Commons


The published version of this Working Paper may be found in the 2000 publication: *Forecasting Retirement Needs and Retirement Wealth.*

This paper is posted at ScholarlyCommons. [https://repository.upenn.edu/prc_papers/620](https://repository.upenn.edu/prc_papers/620)

For more information, please contact repository@pobox.upenn.edu.
How Prepared are Americans for Retirement?

Disciplines
Economics

Comments
The published version of this Working Paper may be found in the 2000 publication: *Forecasting Retirement Needs and Retirement Wealth.*

This working paper is available at ScholarlyCommons: https://repository.upenn.edu/prc_papers/620
In this era emphasizing individual economic responsibility, policymakers and the media often pose a question that many of us ask ourselves: "Will current workers retire in comfort?" This chapter takes a practical approach to answering this question, one that might be adopted by an intelligent layperson using currently available financial planning tools. Specifically, we use as our assessment model a publicly available software package known as the Quicken Financial Planner (QFP), manufactured by the Intuit Corporation. We pass through the Planner a recent nationally representative survey of Americans known as the Survey of Consumer Finances, a study that contains extensive data on household financial and economic status. The objective is to assess the preparedness of the American public for retirement. In the process, we also comment on usefulness of the QFP as a modeling tool. Finally, we suggest ways to help researchers produce better surveys of household economic status so as to improve the value-added of research to policy and practice.

We begin the discussion with a review of the economics literature on workers' preparedness for retirement. Next, we describe the range of publicly available retirement and financial planning software and provide a detailed overview of the Quicken Financial Planner, highlighting its comprehensiveness but also noting its limitations. We implement the model using data from the Survey of Consumer Finances (SCF) and provide results from the empirical analysis. The discussion concludes with a summary of key results, accompanied by suggestions for improvements in financial planning software and the design of surveys.

**Previous Studies**

Whether the baby boom generation is preparing adequately for retirement was analyzed by Bernheim (1992), who set up a complex liquidity-
constrained lifetime utility maximization problem assuming certainty and perfect foresight. In his model, inputs include (a) assumed data such as rates of mortality, time preference, and intertemporal substitution; (b) environmental factors such as social security, tax structures, and macroeconomic conditions; and (c) household characteristics. Household characteristics include those imputed (e.g., age-earnings profiles, family composition, and pension income), and those taken from a database on American households fielded by Merrill Lynch in early 1992. That survey obtained information on household demographic and economic characteristics as well as financial and nonfinancial assets, home equity and other real estate, pension coverage, and debt. Bernheim estimated age-wealth profiles using these data, and on the presumption that birth cohorts behave similarly at different ages, and forecast how wealth is likely to accumulate in the future for the baby boom generation. His evaluation then compared observed asset accumulation paths with those predicted by his economic model, which he summarized in an “index of saving adequacy.” Bernheim concluded that the typical American household would have to triple its rate of asset accumulation to finance retirement. Married couples and low-income households were found to be holding more adequate assets than singles and high-income households; he attributed this result to the redistributive effects of social security.

A follow-up study by Bernheim and Scholz (1993) used a similar simulation approach but instead used the 1983 and 1986 Surveys of Consumer Finances to derive actual asset paths. This study concluded that actual asset trajectories were well below target trajectories in families where the head of household had not completed college. By contrast, actual and desired trajectories matched up well in households who had completed college; the main reason appeared to be that the latter were more likely to be covered by a pension plan.

Taking a different tack, the Congressional Budget Office (1993) examined the question of how well baby boomers were preparing for retirement by comparing households aged 25-44 in 1989 with households at the same point in their life cycle in the early 1960s. Boomer households proved to have more real income and a higher ratio of wealth to income than their parents' generation. Furthermore, the CBO found that people ages 55-74 in 1989 were relatively well off, and baby boomers were anticipated to have higher real retirement incomes than their retired parents. These results have been interpreted to mean that baby boomers can expect a comfortable retirement.

In a recent critical review of this literature, Gale (1997) found fault with all approaches. Regarding the CBO study, he pointed out that concluding that current workers will do well in retirement requires making some questionable assumptions. One is that the current generation of elderly is doing well, a second is that boomers will face the same prosperous economic
conditions from now until retirement that their parents did, and a third is that boomers will be content to fare as well in retirement as did today's retirees. The last presumption, in particular, is debatable, as it is likely that boomers will aim for retiree living standards comparable to their own working years, rather than the living standard of today's retirees.

Regarding the Bernheim research, Gale noted that Bernheim's model did not use retirement needs to judge the adequacy of retirement saving using households' entire asset stock. Rather, he examines the ratio of "other assets" to the part of total needs not covered by social security and pensions. He therefore concluded that the Bernheim index did not indicate a household's adequacy of retirement preparations. For example, if a household needed 100 units of wealth to retire, and it was on course to generate 61 units in social security, 30 in pensions, and three in other assets, it would have 94 percent of its retirement needs covered. The Bernheim index would indicate that the household was saving only 33 percent of what it needs (= 3 / (100 - 61 - 30)). Finally, Gale argued that several of Bernheim's other assumptions were faulty, including a likely understatement of pension benefits, the exclusion of all housing wealth and inheritances, a common retirement age of 65, and no allowance for retirees' lower work-related and other expenses.

In his own research which used a variant of Bernheim's model, Gale drew on the 1992 Survey of Consumer Finances to explore what proportion of households save adequately for retirement, the traits of households who don't save, and how big their shortfall will be. He estimated that, in married couples where the husband worked full-time, 30-53 percent of households were saving inadequately. He also concluded that adequacy was higher among the more educated, those with a pension plan, and those with higher income, while it was lower among the older population. His wealth shortfall or adequacy gap measure was defined as the difference between target and actual wealth among households saving inadequately (he too ignored all housing wealth). He found that the median inadequate saver had a relatively small shortfall of $22,000 or about six months of earnings. The shortfall, however, increased significantly with age; among 60-64-year-olds, the median inadequate saver was short $75,000, or about 26 months of earnings.

As will be described in more detail below, the approach we adopt in this chapter is more direct and conservative than those of the studies just described. Where possible, we draw on existing data from the 1992 Survey of Consumer Finances rather than inferring them as Bernheim did. If there is a doubt, we attempt to skew our assumptions in favor of finding saving adequacy, particularly by allowing the saving rate of households to increase with age. Moreover, our approach is immune to some of Gale's critiques, since we measure saving adequacy in terms of the standards of current workers (rather than retirees); we include housing wealth in measured assets; we use workers' self-reported retirement ages; and we allow for a drop
in living expenses on retirement. Our approach is also superior to Gale’s since we incorporate households with nontraditional as well as traditional family structures in the empirical analysis.

**Retirement and Financial Planning Software**

There is an expanding universe of retirement and financial planning software and Internet sites available to the public offering advice on saving for retirement and other financial goals, as well as on asset allocation. These programs are often proprietary packages marketed by mutual fund and insurance companies with investment products to sell, and also include independent packages marketed by financial experts and consumer software companies. When these were first introduced, most packages focused on retirement planning, with advice on asset allocation a secondary consideration. More recently, software and Internet sites focus on asset allocation advice, with retirement planning taking a secondary role.

These software packages fill an important need. Middle-income and middle-aged Americans are increasingly holding defined contribution pension plans (and especially 401(k) and 403(b) plans), rather than traditional defined benefit plans as in the past. Most defined contribution pensions are voluntary (within legal and plan limits) and allow the plan participant to contribute at any level elected, often with encouragement from plan sponsors through employer matches. Increasingly participants feel they need education, guidance, and financial advice on the appropriate contribution to make. Moreover, most 401(k) and 403(b) plans allow for self-direction in the investment of contributions, necessitating education, guidance, and advice on asset allocation. Adding to the sense of urgency is public debate over the solvency of the social security program and the explosion of mutual fund investment alternatives.

Software packages and Internet sites are practical and economical media to provide this information to masses of people. Much can be conveyed in an engaging way through planning software; although complete customization is impossible, an intelligently designed program can allow for a myriad of situations and offer possible solutions to problems. The major cost of building such programs is in the design and testing stages; expenses for marketing and support are likely to be modest. Face-to-face meetings with a professional personal financial consultant (supported by professional-grade planning software) may produce more specific advice and may be more appropriate for especially complicated situations, though the more personal approach is generally more expensive than using a computer software package. Moreover, software offers privacy and a “do-it-yourself” approach, which make it attractive even to some who do use a personal financial consultant.

Although these programs differ in focus, sophistication, and level of de-
How Prepared Are Americans for Retirement?

Most personal planning packages take an actuarial approach to saving for retirement. Typically, the user sets a goal for the desired income flow in retirement, and the appropriate savings rate is calculated by the program to enable the user to reach this goal. This approach is consistent with the standard design of defined contribution plans, wherein employer contributions are constant as a share of salary over the working life of the participant, and continuous participation is highly encouraged. Moreover, the actuarial approach is consistent with many tax rules governing pension plans, particularly nondiscrimination requirements, which make it difficult for plan sponsors to tailor contribution rates to age, income level, or job tenure. The software programs do not attempt to optimize saving and borrowing rates over the life cycle in response to a desire for a smooth consumption path or to adjust to particular age-specific expenditure patterns.

Another feature common to planning packages is the use of risk tolerance questionnaires to assess the appropriateness of various asset classes for investor portfolios. Some of the packages, especially those appearing more recently, also use optimization techniques and modern portfolio theory to advise on the selection of efficient portfolios that maximize expected returns for a given level of risk. Finally, nearly all the packages provide a basic education on important financial planning principles including the time value of money, the benefit of tax deferral, the importance of diversification among asset classes, the trade-off between risk and return, and so on.

The Quicken Financial Planner

The universe of personal financial planning software is vast and changing, so we selected a widely used package for our analysis known as the Quicken Financial Planner from Intuit. The main purpose of the QFP is to evaluate and give advice on the steps necessary to assure full financial preparedness for retirement. To do this, the Planner poses a series of questions about the current demographic and economic characteristics of all members of a household, their personal plans and preferences, their expectations of future personal and general economic conditions, their pension coverage, and complete details of their personal balance sheet, both assets and liabilities. The QFP also asks about household asset allocation choices and risk preferences. The planning exercise is a search for answers to the following questions: can the household achieve a specified replacement rate of income in retirement under the current plan, and, if not, what changes, especially in saving, need to be made?

The Planner is a fairly sophisticated and comprehensive planning package, one that incorporates most of the essential elements of financial planning, albeit with some significant weaknesses. Like older-generation packages, its strength is in retirement planning; nevertheless, the QFP also covers
asset allocation. It appears useful for households at most income and wealth levels, except perhaps those at the very bottom and the very top of the income and wealth distributions (or those with unusual financial situations). Moreover, it is more widely utilized than its competitors among independent packages and therefore may directly influence saving and asset allocation behavior for reasonably large numbers of the population. Finally, despite its sophistication, QFP is relatively easy to use and avoids the use of confusing economic and financial jargon.4

Analyzing Americans' Retirement Plans

In an ongoing project of the Federal Reserve Board, the Survey of Consumer Finances (SCF) collects information from a representative sample of American households about many of the demographic, economic, and financial factors required by the Planner. It is perhaps the most complete publicly available and nationally representative survey of Americans of all ages. The SCF provides a variety of financial data that we use as the basis of our empirical analysis of the prescriptions of the Quicken Financial Planner and the Planner’s assessment of the adequacy of Americans’ retirement savings. Hence we can use the SCF as a source of data to feed the QFP model to generate insights about households’ retirement prospects. If and when data are missing, we employ information from the empirical economics literature, other surveys, and common sense.

Outline of the Procedure

Our approach had three steps. First, we created an extract containing household data from the 1992 SCF and any additional assumptions; this was formatted for input to the QFP. Second, we submitted this input file to two helpful staff members at Intuit who read our generated input file, entered the data into the QFP, and saved machine readable versions of the QFP output. Finally, the output was returned to us and entered into our statistical analysis package.

In designing the input file several assumptions and modifications were required to fit the input data into the QFP format.

Sample Selection

Using the QFP to generate a financial plan for retirement made sense for only a subset of the SCF respondents. For example, in order for “retirement” to be meaningful, we felt it reasonable to ensure that at least one member of each household was employed in a job from which he or she could “retire.” Hence a first criterion for selecting SCF households for our sample was that either the respondent or the spouse/partner had to be
employed full-time. Survey observations representing roughly 61 million of the 96 million households in the United States met this criterion in the 1992 SCF.5

We also wanted to ensure that the households we ran through the Planner represented middle America to the greatest degree possible. To this end, we excluded SCF respondents with unusually large non-financial wealth (over $1 million); these people are probably concerned with different estate planning issues than the average user of a financial software program. Additionally, we excluded people with relatively high annual earnings (over $125,000) since they too may be different from the “typical” household.6 We also imposed an age limit on the sample, including only households with a respondent or spouse at least age 25 but younger than 71. Of those households in which there was at least one full-time worker, roughly 96 percent met this criterion.

Additional sample selection decisions pertain to the difficulty of translating SCF information into inputs for the QFP. Table 1 describes the procedure generating the sample used for the Planner exercise, and shows that lack of a retirement age (due to no full-time job or nonresponse) was a major reason for sample omission. After the age, employment, and retirement screens were applied, the remaining sample represented 42.7 million households. The table also shows some of the other reasons households were excluded from the exercise.7

Variable Construction

The SCF affords ample data to create most inputs required by the QFP, but there are a few instances where information is lacking.8

Retirement date. One of the central issues in retirement planning is the timing of the decision to retire. Unfortunately, the SCF does not ask respondents “At what age do you plan to retire?” (Indeed, because “retirement” can mean different things to different people, it would not necessarily be productive to get a response to this particular question.) The survey questionnaire does ask currently employed individuals several questions regarding expectations about future labor supply.9 We use those responses to estimate retirement dates for the respondent and/or spouse/partner. This information is likely to be least accurate for determining retirement intentions for younger households, but it was the best available information in the survey regarding the timing of retirement.10

Other demographic data. The SCF contains information on age, sex, and a self-assessment of health status. We use all of this information to generate a life expectancy for the sample members that is based on the default values reported by the QFP plus 10 years. We add the 10 years to reported life expectancies for several reasons. First, it does not appear that the QFP builds in any anticipated increase in life expectancy over time. Since life
## Table 1: Sample Characteristics

<table>
<thead>
<tr>
<th>Reasons for Selection of Sample Members</th>
<th>Observations Removed</th>
<th>Observations Remaining After Sequential Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count (n)</td>
<td>Weight (mil.)</td>
</tr>
<tr>
<td>Total 1992 SCF sample size, first implicate</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Data included from an absent spouse</td>
<td>9</td>
<td>0.2</td>
</tr>
<tr>
<td>Respondent birth year indicates age under 25 or over 70</td>
<td>686</td>
<td>18.3</td>
</tr>
<tr>
<td>Respondent does not have valid information to generate a retirement age</td>
<td>1,902</td>
<td>48.5</td>
</tr>
<tr>
<td>Respondent has spouse under 25 or over 70</td>
<td>276</td>
<td>6.8</td>
</tr>
<tr>
<td>Neither spouse nor respondent has a full-time job</td>
<td>1,040</td>
<td>29.7</td>
</tr>
<tr>
<td>First mortgage has unusual features</td>
<td>14</td>
<td>0.3</td>
</tr>
<tr>
<td>Second mortgage has unusual features</td>
<td>8</td>
<td>0.2</td>
</tr>
<tr>
<td>Special assets owned by household of over $1 million</td>
<td>626</td>
<td>1.4</td>
</tr>
<tr>
<td>Household income from employment cannot cover taxes, loan payments, etc.</td>
<td>1,013</td>
<td>22.0</td>
</tr>
<tr>
<td>Respondent or spouse has future job or spouse no main job</td>
<td>265</td>
<td>7.4</td>
</tr>
<tr>
<td>Other rejections/problems</td>
<td>5</td>
<td>0.2</td>
</tr>
<tr>
<td>Income or earnings of $125,000 or more**</td>
<td>197</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*Source: Authors' calculations based on 1992 SCF data.*

*This column contains the total SCF sample weight of the observations, in millions of households.

**These observations flagged after the removal of all other observations for all other reasons; they are maintained on datafile for robustness checks.
expectancy has trended upward over time and is likely to continue to do so in the future, we felt it prudent to build this expectation into the analysis. Second, the Planner does not offer a way to set aside financial resources for unforeseen medical or health expenses in retirement. Lacking a direct way to protect against such risk, we felt that extending life expectancy seemed appropriate. Finally, the QFP does not take into account household uncertainty with regard to the length of life, so a risk averse person might legitimately use a longer life expectancy.

**College expenses.** Using SCF data in 1992, we include information for the oldest five children in each household under the age of 22. This helps determine when the household is likely to experience outlays for college expenses. We assume that children rely on household resources to fund undergraduate expenses only, and we assume that all children will attend college from the age of 18 to 22. To estimate college costs, we assume that all households reside in the state of Ohio and pay college expenses at one of three Ohio institutions determined by the (1992) level of household income salary. In households with salary incomes of under $40,000, children are assumed to attend a community college. For those with income in the range $40,000–$100,000, children are assumed to attend a public, four-year, state university. In households in which salary income is over $100,000, the children are assumed to attend a private college. It is further assumed that each child will contribute $2,000 per year toward college expenses. In addition, the cost of college is offset according to income. For household incomes under $35,000, financial aid is assumed to cover all college expenses not covered by the student's contribution. For incomes between $35,000 and $70,000, financial aid is assumed to cover half of the remaining college cost. There is assumed to be no financial aid for households with over $70,000 in annual income. These assumptions are roughly consistent with Department of Education information regarding college financial planning.

**Salary growth.** The SCF provides detailed information on respondents' and spouses' current salaries and earnings. We also determine whether each respondent is self-employed, which enables use of the Planner's ability to calculate social security taxes differently for wage/salary earners and the self-employed. In contrast, the SCF provides no indication of the respondents' long-term expectations with regard to salary growth, though it is reasonable to expect that people anticipate pay increases over time, and also that pay growth rates are likely to be higher for younger than for older individuals. Therefore we assumed that there are three "stages" of earnings growth anticipated: people age 25–35 are assumed to have real pay grow at 5 percent per year; people age 36–50 are assumed to have pay grow at 1 percent; and no real growth rate in pay is allocated to people over the age of 50.11

In addition, for tax purposes, all households are assumed to reside in the state of Ohio; the QFP uses 1992 earnings to evaluate the average income tax rate for the household before and after retirement.
Taxable financial assets. From the SCF we obtain information on household checking and savings accounts, money market accounts, CDs, stocks, bonds, mutual funds, brokerage call accounts, and the value of other managed accounts. Each of these items is entered into the QFP as part of the taxable portfolio of assets. The SCF does not ask any specific questions about any amounts that households plan to save in taxable forms. As a result, we cannot use the Planner’s ability to account for a household’s taxable saving plan. (However, we do use the Planner’s “sweep” feature to “simulate” saving—we return to this below.)

Tax deferred retirement saving vehicles. With regard to IRA and Keogh accounts, the SCF asks respondents only about how much money the households have accumulated currently in these accounts. There is enough information to construct a crude estimate of how the accumulations are allocated among asset classes; however, there is no information on typical contributions to these accounts, so we cannot use the QFP to predict future contributions. With regard to employer-provided pension and savings plans on the “main job” of the respondent and spouse, the SCF asks for information for up to three pension plans for the respondent and three for the spouse/partner. These plans can be either defined benefit or defined contribution, and for the purposes of generating information regarding tax deferred savings plans, we are only interested in the defined contribution accounts. (We enter the information about DB plans in the QFP section on anticipated pension benefits.) There are SCF data on the level of current employee contributions to these plans, as well as the level of contributions provided by an employer. But we lack information about contributions that an employer may “match” in the context of a 401(k) or other plan. We use available data on current contribution amounts to enter each DC pension into the Planner as a separate savings plan. We also use SCF data on current accumulations and allocations of accumulations in account-type plans.

Home equity/mortgages. There is extensive SCF information that can be used to evaluate home equity levels. This includes the purchase date of the home, home mortgages, expenses associated with the home (association or property management fees), and (in a few cases) rental income associated with the home. In a few cases, mortgage loans associated with homes could not be translated into the simple structure that the QFP requires. In particular, individuals whose mortgage loans as reported in the SCF “had no set number of years” or “no set number of payments” were dropped from the sample.

It is widely known that residential housing constitutes a very large share of the net worth of American households. It is also a well-established empirical fact that people do not always consume their entire home equity to finance retirement. On the other hand, some retirees relocate and at the same time, “trade down” their homes, effectively liquidating at least a portion of their
housing wealth. We felt it was therefore reasonable to assume that upon the retirement of the last individual in the household, homeowners would purchase a new residence worth 75 percent of the value of the original home. All remaining mortgage payments, if any, would be translated at the point of trade-down into a new loan, and if the individual was over 55 at retirement, the one-time capital gain exemption is used, according to the tax law in effect in 1997. All remaining after-tax proceeds from the transaction, if any, were deposited in the taxable savings portfolio.

Debt. In addition to collecting information about home mortgages, the SCF gathers information on other consumer loans. We included in the analysis lines of credit, educational loans, loans/mortgages on other real estate holdings, and other consumer loans; only loans with a standard payment schedule are used (in the case of lines of credit, we assume a 10-year repayment period and monthly payments on these borrowings).

Special assets and businesses. The SCF includes a great deal of information about special assets that might be owned by a household. These include the value of loans or land contracts held by the household, shares of non-residential real estate, and other property, as well as information on the value of business interests owned. All of this information was used in generating asset level data, but none of these assets is assumed to generate current or future income. This is because there is no detailed information as to the household’s plans for the assets, or whether any current income flow from the asset is stable over time. We do assume that these special assets increase in value with inflation. We note that these assumptions imply that “special assets” simply serve to raise the net worth of households and do not otherwise affect the retirement plans. Our primary motivation for tracking these assets was to assure that none of our sample households owned more than $1 million in these types of special assets.

Expenses. The SCF did not ask respondents about current or future living expenses, which means that we had no direct measure of net saving. We dealt with this in the planning exercise using several strategies. First, we assumed that living expenses in 1992 made up the balance of current income after taxes on earnings, planned saving, housing expenses, and debt payments. Second, we assumed that living expenses increase with inflation and real income increased at a slightly higher rate (related to age, described above). Third, we assumed that individuals “sweep” all excess cash into taxable savings. Finally, we assumed that living expenses fell 20 percent at the point of retirement, and by a further 20 percent when one member of a couple died.

These assumptions amount to presuming that discretionary saving in 1992 equaled the (after-tax) earnings on accumulated savings. This satisfies a number of “reasonability” requirements. First, individuals with a “taste for saving” (evidenced by higher accumulation of assets by 1992) save more
than others. Second, the assumption is consistent with a “mental accounts” approach toward saving, in which only current cash flow generated by labor earnings is spent to cover consumption. Third, it presumes that individuals save more as they approach retirement due to increases in labor income relative to living expenses, as well as the compounding of interest. Fourth, it seems reasonable to assume that living expenses will decline slightly at the point of retirement (perhaps due to the disappearance of “work related” expenses). These assumptions, on net, are quite conservative for the purpose of our analysis; while current taxable savings is small according to our assumptions, future savings is probably overestimated, particularly in young families. More specifically, the “expenses equal to current disposable earnings” assumption implies that the principal repayment of debt is net saving. Once loans are repaid (including mortgages), the entire payment amount is credited to taxable saving, whereas in actuality some of these payments will be diverted to other forms of consumption.

Risk and return. The SCF asks a single question regarding the willingness of the respondent to take financial risks, characterizing the respondent’s attitude as (a) willing to take substantial financial risks expecting to earn substantial returns, (b) willing to take above average financial risks expecting to earn above average returns, (c) willing to take average financial risk expecting to earn average returns, or (d) not willing to take any financial risk. We map these responses into return categories in the QFP. Thus for households saying (a) we assume they invest consistent with a 10 percent annual rate of return on financial investments; those saying (b) are given a 9 percent rate; those responding (c) are given a 7.5 percent rate; and the remainder are assigned a 6 percent rate.

Social security and other pensions. The 1992 SCF did not ask respondents about anticipated social security benefits. In order to generate the needed input for the social security section of the QFP, we placed each individual into one of the four “rough estimate” bands offered in the Planner using the highest salary (in 1992 dollars) that each individual was forecast to attain according to projected earnings path. Turning to pensions, a great deal of information was available on anticipated pension benefits, all of which we used in the Planner, along with the assumption that benefit amounts were fixed in nominal terms after retirement. In addition the approach assumed that company pensions used a joint and survivor formula with 50 percent to the surviving spouse.

Special features. Two of the Planner’s special features proved useful in our exercise. First, we allowed the QFP to sweep all excess cash flow generated by the household into taxable savings. Initially, swept amounts were zero for almost every household, since, by definition, living expenses are a residual of earnings minus all outflows except college expenses. However, because younger households were assumed to have earnings that rose faster than
living expenses, loans were eventually paid off, and a few households had some special income (e.g., lump sum pensions, trust accounts, rental income from housing), these amounts were often positive and sizeable in later years. Second, we allowed the Planner to sell financial assets to cover cash shortfalls in years prior to retirement. Thus we permitted household to "raid" tax-deferred retirement accounts for the purposes of meeting unexpected expenses. Note that given our assumptions, the only possible "unexpected" expense would be college.

**Empirical Findings**

To understand the results we generate using the QFP and SCF respondent data, we must call attention to some of the implications of assumptions made thus far. For example, we assumed that living expenses increased with inflation but labor income rose at least as fast if not faster. This implies that the analysis boils down to an actuarial calculation of whether household retirement plans are consistent with (1) the level of accumulated assets in 1992; (2) college expenditures; (3) planned saving in employer-sponsored tax-deferred saving plans; (4) future social security and pension benefits; and (5) life expectancy. Given that we defined living expenses as a residual, the only reasons for plan failure prior to retirement are that college expenses proved too large to be affordable, or that the household had no financial assets to start with. As we shall show, the latter reason turns out to be by far the more frequent explanation for early failure in retirement financial plans. After retirement, a household’s plan could fail as a result of inconsistencies in any or all of the plan’s dimensions.

**Household Characteristics**

Summary statistics for the households used in the analysis appear in Table 2. All summary statistics presented here (and elsewhere unless otherwise noted) use SCF sample weights. Deletion of some observations from the file means that the resulting sample is no longer representative of the entire U.S. population; nevertheless, sample weights are still necessary to reduce the relative impact of SCF over-sampling of wealthy individuals. The unweighted final number of observations included 1,066 households.

As expected, the households examined have characteristics reflective of “middle America.” The median age of respondents in the sample was 42 years, and the median number of persons in each household was 3. Median life expectancy assigned to the respondents was 93. Households in the sample, on average, appeared to be intending to retire somewhat early, as the median retirement age was 61, while the median number of years remaining in the plan after the first retirement in the household was 40. The estimated
TABLE 2: Characteristics of Included Sample

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of respondent at end of 1992</td>
<td>43.3</td>
<td>42</td>
<td>10.7</td>
</tr>
<tr>
<td>Respondent age at death</td>
<td>94.5</td>
<td>93</td>
<td>2.5</td>
</tr>
<tr>
<td>Persons in household</td>
<td>2.8</td>
<td>3</td>
<td>1.4</td>
</tr>
<tr>
<td>Age of respondent at time of 1st retirement</td>
<td>59.0</td>
<td>61</td>
<td>8.8</td>
</tr>
<tr>
<td>Number of years in plan before 1st retirement</td>
<td>15.8</td>
<td>14</td>
<td>10.5</td>
</tr>
<tr>
<td>Number of years in plan after 1st retirement</td>
<td>41.5</td>
<td>40</td>
<td>9.3</td>
</tr>
<tr>
<td>Number of years in plan</td>
<td>57.3</td>
<td>58</td>
<td>10.5</td>
</tr>
<tr>
<td>Number of children</td>
<td>0.98</td>
<td>1</td>
<td>1.11</td>
</tr>
<tr>
<td>Total 1991 income (from SCF)</td>
<td>$42,000</td>
<td>$37,000</td>
<td>$25,000</td>
</tr>
<tr>
<td>Total salary income as recorded by QFP</td>
<td>$41,000</td>
<td>$39,000</td>
<td>$24,000</td>
</tr>
<tr>
<td>Total living expenses entered into QFP</td>
<td>$24,000</td>
<td>$22,000</td>
<td>$14,000</td>
</tr>
<tr>
<td>QFP net worth in 1992</td>
<td>$105,000</td>
<td>$53,000</td>
<td>$211,000</td>
</tr>
<tr>
<td>QFP net worth at retirement</td>
<td>$397,000</td>
<td>$241,000</td>
<td>$501,000</td>
</tr>
<tr>
<td>QFP net worth at end of plan</td>
<td>$1,080,000</td>
<td>$221,000</td>
<td>$2,246,000</td>
</tr>
<tr>
<td>Total sample observations</td>
<td>1,066</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total weighted observations</td>
<td>33,934,884</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors' calculations based on 1992 SCF data.
Notes: All dollar amounts in 1992 real dollars. Sample includes individuals with less than $125,000 in income and salary.

1992 salary entered into QFP had a median of $39,000. Median net worth of the sample members in 1992 was $53,000 (average net worth was nearly twice that, indicating a very skewed distribution of wealth.)

Measures of Success and Failure

Table 3 summarizes output from the QFP, showing information regarding the “success” or “failure” of household retirement plans for the overall sample and also for selected subgroups. The bottom line is that slightly over one-half (52 percent) of the SCF households are predicted to fail to finance their retirement.

It is informative to differentiate between two separate stages at which retirement plan failures can occur. First, we track the number of failures that occur before the date at which the spouse or respondent retires (here we use the earlier of the retirement dates if there is a working spouse or partner in the household). Second, we track the number of failures that occur after the retirement date. We also measure the degree of failure or success of the retirement plan. Table 3 indicates the average number of years in the retirement period where the household lacks sufficient financial resources; this is a measure of the degree of the shortfall in retirement plans. We note that the mean reported is tabulated only across those households whose plans are at least take them into the retirement period—that
<table>
<thead>
<tr>
<th>Sample Count</th>
<th>Failed at Any Time</th>
<th>Failed Before Retirement</th>
<th>Failed After Retirement</th>
<th>Years Left</th>
<th>Average Yrs</th>
<th>Years Funded After Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mil.</td>
<td>%*</td>
<td>Mil.</td>
<td>%*</td>
<td>Mil.</td>
<td>%*</td>
</tr>
<tr>
<td>Entire sample</td>
<td>33.95</td>
<td>100.0</td>
<td>17.64</td>
<td>52.0</td>
<td>5.15</td>
<td>15.2</td>
</tr>
<tr>
<td>Respondent over age 50</td>
<td>9.90</td>
<td>29.2</td>
<td>6.03</td>
<td>60.9</td>
<td>1.22</td>
<td>19.2</td>
</tr>
<tr>
<td>Has children</td>
<td>16.01</td>
<td>47.2</td>
<td>7.91</td>
<td>49.4</td>
<td>3.08</td>
<td>20.5</td>
</tr>
<tr>
<td>Has personal loans</td>
<td>5.77</td>
<td>17.0</td>
<td>2.63</td>
<td>45.6</td>
<td>1.18</td>
<td>20.5</td>
</tr>
<tr>
<td>Has home mortgage</td>
<td>16.32</td>
<td>48.1</td>
<td>6.67</td>
<td>40.9</td>
<td>1.56</td>
<td>9.5</td>
</tr>
<tr>
<td>Has home</td>
<td>21.35</td>
<td>62.9</td>
<td>10.16</td>
<td>47.6</td>
<td>2.21</td>
<td>10.4</td>
</tr>
<tr>
<td>Has pension</td>
<td>21.61</td>
<td>63.7</td>
<td>9.83</td>
<td>45.5</td>
<td>2.33</td>
<td>10.8</td>
</tr>
<tr>
<td>Total financial investments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>3.78</td>
<td>11.1</td>
<td>3.78</td>
<td>100.0</td>
<td>0.00</td>
<td>0.0</td>
</tr>
<tr>
<td>Under $4,999</td>
<td>8.47</td>
<td>25.0</td>
<td>4.55</td>
<td>53.7</td>
<td>0.97</td>
<td>11.5</td>
</tr>
<tr>
<td>$5,000–$24,999</td>
<td>9.36</td>
<td>27.6</td>
<td>4.76</td>
<td>50.9</td>
<td>0.38</td>
<td>4.1</td>
</tr>
<tr>
<td>$25,000–$99,999</td>
<td>8.32</td>
<td>24.5</td>
<td>3.08</td>
<td>37.0</td>
<td>0.02</td>
<td>0.2</td>
</tr>
<tr>
<td>Over $100,000</td>
<td>4.00</td>
<td>11.8</td>
<td>1.48</td>
<td>36.9</td>
<td>0.00</td>
<td>0.0</td>
</tr>
<tr>
<td>Education of head</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than High School</td>
<td>3.30</td>
<td>9.7</td>
<td>2.26</td>
<td>68.4</td>
<td>0.87</td>
<td>26.2</td>
</tr>
<tr>
<td>High School Diploma</td>
<td>10.20</td>
<td>30.1</td>
<td>6.34</td>
<td>62.2</td>
<td>1.99</td>
<td>19.5</td>
</tr>
<tr>
<td>Some College</td>
<td>6.22</td>
<td>18.3</td>
<td>2.90</td>
<td>46.6</td>
<td>0.80</td>
<td>12.9</td>
</tr>
<tr>
<td>College Degree</td>
<td>10.42</td>
<td>30.7</td>
<td>4.91</td>
<td>47.1</td>
<td>1.29</td>
<td>12.3</td>
</tr>
<tr>
<td>Prof. Degree</td>
<td>3.79</td>
<td>11.2</td>
<td>1.24</td>
<td>32.6</td>
<td>0.20</td>
<td>5.3</td>
</tr>
<tr>
<td>1992 earnings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>6.54</td>
<td>19.3</td>
<td>3.84</td>
<td>58.8</td>
<td>2.35</td>
<td>35.9</td>
</tr>
<tr>
<td>$20,000–$39,999</td>
<td>10.95</td>
<td>32.3</td>
<td>5.44</td>
<td>49.6</td>
<td>1.08</td>
<td>9.8</td>
</tr>
<tr>
<td>$40,000–$79,999</td>
<td>13.52</td>
<td>39.8</td>
<td>6.97</td>
<td>51.6</td>
<td>1.59</td>
<td>11.8</td>
</tr>
<tr>
<td>Over $80,000</td>
<td>2.93</td>
<td>8.6</td>
<td>1.39</td>
<td>47.4</td>
<td>0.13</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Source: Authors' calculations based on 1992 SCF data.
*Percent of total observations in row.
**Includes only those observations that fail during retirement; i.e. does not include failures before retirement.
***Includes all observations with plan failures (both before and after retirement) as well as those with successful plans.
is, households whose plans fail before the retirement year are excluded. Table 3 also shows the average number of years for which the plan indicates there will be sufficient financial resources. Here, all observations in the sample are included in these averages.

Figures 1–3 also summarize the Planner's calculations graphically. Each of these figures plots "success rates" for the plans over time, where time is measured relative to the household retirement date. In the figures, the "success rate" is defined as the (weighted) number of plans that have not failed as of each year, divided by the total (weighted) number of plans observed in each year. All plans are (as a result of our sample selection criteria) observed at the point of retirement; however, the sample size shrinks in both directions away from this point. The figures plot the success rates for periods of up to 30 years before retirement to up to 40 years after retirement.

Turning to the specific results, the first row of Table 3 shows that success rates are constant in the years prior to retirement but then decline steadily following retirement. The first row of Table 3 indicates that 15 percent of the households in the sample run out of financial assets before retirement.
This seems like a large number, given that our assumptions imply that college expenses are the only unexpected outflows that occur prior to retirement. The reason why so many households fail before retirement is that roughly 11 percent of the sample starts the plan with no financial assets at all. In other words, they were failing before they ever began. In addition, a closer examination showed that only 3 percent of the sample failed before retirement as the result of inability to pay for college expenses. In the remaining 1 percent of cases, the household failed to fund the initial retirement year.

By the tenth year of the retirement period, household success rates dropped from roughly 85 percent to around 65 percent. That is, 20 years into retirement, roughly 45 percent of the households failed in retirement planning; after 30 years, over 50 percent failed. In other words, at some point following retirement, 37 percent of the households in the sample ran out of assets.

Of course this statistic is influenced by the assumptions and underlying
Figure 3. Retirement plan success rates by 1992 earnings level of household. Source: Authors’ calculations based on 1992 SCF data.

...data used in the study, whereas for any individual household, success or failure will be determined by its specific levels of initial wealth, salary, life expectancy, and timing of retirement. In order to attempt to further evaluate the relative importance of some of these factors, we divide the sample into several subgroups on the basis of key characteristics of interest.20

This analysis reveals that older households (where the respondent was at least 50 in 1992) are more likely to fail than the sample as a whole. This is due, in part, to the assumption that real earnings will rise at least for a while among the young, whereas wage growth is flat for older households. This finding is particularly important because one might have expected the opposite; that is, older households have more assets and are closer to retirement, so they might be expected to be better prepared for retirement. Households with personal loans, and especially mortgages, are less likely to fail than the population as a whole — this is perhaps due to the assumption that once loans are repaid, loan payments are in effect treated as net saving. Households with homes and mortgages are not very different from others in the population in terms of success rates before retirement; however, these...
how households have generally higher success rates after retirement. Those with mortgages have the highest success rates: at a point 30 years after retirement, 60 percent of these households' plans had not yet failed, compared to the 50 percent failure rate on average. Probably not surprisingly, households with children have lower success rates than the rest of the population before retirement, probably attributable to the college expenses. After retirement, these households appear to have greater success rates than other households in the population.

The lower portion of Table 3 tabulates failure rates by three additional household characteristics: the total amount of financial assets owned by the households as of 1992, the education of the respondent, and the 1992 household earnings level. With regard to financial wealth, there is nothing unexpected here, as there is nearly a monotonic decrease in the failure rates as asset totals rise. Failures before retirement are concentrated among those who begin their plans with few assets. Failure is more common among the less educated than among the more educated, both before and after retirement. Figure 2 shows that the success rate for those with less than a high school education falls precipitously following retirement: as of retirement, there is a 20 percent difference between the success rate of the most highly educated (96 percent) and the least educated (76 percent). Only five years after retirement, this gap doubles to nearly 40 percent. Plan success rates also vary by income level (see Figure 3). Success rates among the lowest income households are remarkably low before retirement, but rise until the point of retirement. This indicates that a significant number of individuals in this category come under observation with zero financial assets. Another interesting aspect of the income chart is that the relative decline in the success rate over the first 20 years in retirement is much lower for the low than for the higher income groups. For example, the highest income group hits retirement with a success rate of roughly 95 percent. After 20 years in retirement, the success rate among this group is only 65 percent—a drop of 30 percent. For the lowest income group, individuals reach retirement with a success rate of about 65 percent. After 20 years, this falls to around 45 percent, a drop of 20 percent. An important factor accounting for this difference is social security benefits.

Table 3 also indicates how years of life remaining in the plan affect performance. Failure rates are larger for those who must pay for college expenses and those with personal loans (but note there is a very small base for those with personal loans), and the data offer one way of thinking about the degree of success of the financial plans. Some good news can be found in the analysis: on average, households are able to fund almost 24 years of retirement. The number of retirement years that can be financed increases almost monotonically with starting wealth and reflects the same patterns across sub-groups as the failure rate data.
The incidence of plan success and failure is categorized by the respondent's anticipated retirement age in Figure 4. There are clearly higher failure rates among those intending to retire "early" (before age 60); in fact, failure rates for those planning to retire prior to age 50 top 80 percent. By contrast, those with retirement ages of 64 or later have failure rates of around 40 percent. Later retirement dates allow for more saving in the context of the planner's calculations, which accounts for some of these differences. It may also be true that some individuals were simply overly optimistic when reporting an "early" retirement date.

Another way of looking at the patterns of shortfalls pertains to the number of years of living expenses that household plans fail to finance. Perhaps the most interesting thing revealed in Table 4 is that the degree to which household retirement plans fail is relatively less severe for those in the lowest income group.22

We also compute the total real flow of dollars left uncovered by household assets after the failure of a plan, to estimate the seriousness of plan failures.
How Prepared Are Americans for Retirement? 53

### TABLE 4: Summary of Retirement Plan Shortfalls: Years of Living Expenses Left Unfunded After Plan Failure

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Average</th>
<th>Median</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire sample</td>
<td>18.9</td>
<td>17.9</td>
<td>10.2</td>
</tr>
<tr>
<td>Over age 50</td>
<td>16.0</td>
<td>15.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Has children</td>
<td>18.8</td>
<td>17.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Has home mortgage</td>
<td>17.8</td>
<td>17.1</td>
<td>9.2</td>
</tr>
<tr>
<td>Has home</td>
<td>18.3</td>
<td>17.9</td>
<td>9.5</td>
</tr>
<tr>
<td>Has pension</td>
<td>16.9</td>
<td>15.7</td>
<td>8.8</td>
</tr>
</tbody>
</table>

#### 1992 financial wealth

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Median</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under $4,999</td>
<td>19.3</td>
<td>18.5</td>
<td>10.0</td>
</tr>
<tr>
<td>$5,000-$24,999</td>
<td>20.4</td>
<td>19.5</td>
<td>11.1</td>
</tr>
<tr>
<td>$25,000-$99,999</td>
<td>17.4</td>
<td>16.3</td>
<td>8.7</td>
</tr>
<tr>
<td>Over $100,000</td>
<td>16.6</td>
<td>15.0</td>
<td>10.1</td>
</tr>
</tbody>
</table>

#### Education of head

<table>
<thead>
<tr>
<th>Education</th>
<th>Average</th>
<th>Median</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than high school</td>
<td>19.2</td>
<td>17.0</td>
<td>8.8</td>
</tr>
<tr>
<td>High school diploma</td>
<td>18.4</td>
<td>17.9</td>
<td>10.3</td>
</tr>
<tr>
<td>Some college</td>
<td>19.2</td>
<td>17.9</td>
<td>9.1</td>
</tr>
<tr>
<td>College degree</td>
<td>19.5</td>
<td>18.2</td>
<td>11.8</td>
</tr>
<tr>
<td>Prof. degree</td>
<td>17.6</td>
<td>17.5</td>
<td>8.2</td>
</tr>
</tbody>
</table>

#### 1992 earnings

<table>
<thead>
<tr>
<th>Earnings</th>
<th>Average</th>
<th>Median</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $20,000</td>
<td>14.0</td>
<td>10.7</td>
<td>8.9</td>
</tr>
<tr>
<td>$20,000-$39,999</td>
<td>19.8</td>
<td>18.4</td>
<td>10.6</td>
</tr>
<tr>
<td>$40,000-$79,999</td>
<td>19.2</td>
<td>18.7</td>
<td>9.6</td>
</tr>
<tr>
<td>Over $80,000</td>
<td>19.9</td>
<td>19.5</td>
<td>11.1</td>
</tr>
</tbody>
</table>

*Source:* Authors' calculations based on 1992 SCF data.

*Note:* Includes only those households whose plans fail after retirement and have shortfalls.

We find in Figure 5 that average unfinanced expenses for households whose plans fail is roughly $300,000 ($1992). There is also a reasonably wide distribution of shortfall amounts. Roughly 20 percent of the failures face financial shortfalls of under $50,000, about six percent fail by over $1 million, and the rest are in between.

**Comparison with Previous Studies**

Despite the fact that we use an entirely different modeling approach with distinct assumptions and data from those of the prior studies cited above, our results are remarkably similar to those reported by Bernheim and Gale. For example, Gale reports that 53 percent of the population is not saving adequately when he excludes housing wealth — almost the same fraction as in our study. As here, both Bernheim and Gale conclude that savings inade-
TABLE 5: Shortfalls Identified by Financial Planner (real 1992 dollars)

<table>
<thead>
<tr>
<th>Cash Flow Direction</th>
<th>Average</th>
<th>Median</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total amount of shortfall(^a)</td>
<td>$(297,000)</td>
<td>$(273,000)</td>
<td>$455,000</td>
</tr>
<tr>
<td>Total amount of excess(^b)</td>
<td>$389,000</td>
<td>$227,000</td>
<td>$569,000</td>
</tr>
</tbody>
</table>

Source: Authors' calculations based on 1992 SCF data.
\(^a\) includes only plan failures.
\(^b\) includes only plan successes.

Figure 5. Distribution of retirement plan failure amounts. Source: Authors' calculations based on 1992 SCF data.

Figure 5: Distribution of retirement plan failure amounts.

Note: Categories are equally spaced $50,000 bins from $0.

Conclusion

A majority of American households are predicted to fall short in funding retirement, based on our research using a standard financial planning package and a dataset containing high-quality information on consumer assets and saving. We find that those most likely to fail in their retirement saving plans are households headed by the less educated, those with less financial wealth, and those without pensions.
and those lacking a pension. At the same time however, the lower-income and less-educated face a smaller shortfall than do the higher-paid and better educated. Finally, we find that the rise in failure rates over the retirement period is slower among low-income households than among the more highly paid.

We come to these conclusions after combining the Quicken Financial Planner model with data from the 1992 Survey of Consumer Finances. Like many financial planning software tools, QFP provides a useful framework for assessing retirement income needs and for tailoring individual plans for financing retirement. We also note that financial planning software programs in general suffer from limitations. In general, most do not recognize many uncertainties facing households, including uncertainty regarding life expectancy and returns on financial and human capital assets.

Our research suggests several areas where improvements might be made in future data collection efforts for retirement researchers. Because the timing of the retirement decision is such an important aspect of the financial situation of households, it would be useful to obtain more detail regarding household retirement expectations. Additional information would also be invaluable on features of workers' defined contribution pension plans, including employer match rates. Finally, a better assessment of household retirement assets requires additional information on after-tax structured savings plans (through direct deposits or any other mechanism), along with data on planned contributions to or withdrawals from IRAs.

Our analysis could be expanded in several directions. One interesting question is how sensitive the results are to assumptions, particularly regarding the sample construction, anticipated retirement ages, net costs of college, and future levels of social security benefits. It would also be interesting to compare results obtained here with those that would be produced by other datasets including the Health and Retirement Study (Moore and Mitchell, this volume). Finally, it would be instructive to compare our findings using the Quicken Financial Planner with those produced using other software packages.

Though our analysis indicates that many Americans are far from financially prepared for retirement, we take as encouraging the development of sophisticated software planning programs such as the QFP. Indeed, as financial planning software becomes more accessible and more sophisticated, households will surely become better informed, and ideally better protected, against the strains of retirement and other financial challenges.

Appendix: A Detailed Description of the Quicken Financial Planner

The Quicken Financial Planner appears on the computer screen as a tabbed notebook, with major categories of data inputs or outputs listed on the right-side tabs, such as "Income," "Personal," or "Results." Upon opening each
right-side tab, several upper tabs appear, each containing one or several notebook pages. One can open the notebook at any right-side tab or can proceed sequentially by hitting “Next” at the bottom of every page. As we will see, the Planner is explicitly designed to aid in financial planning for retirement, children’s college education, and life insurance needs; one can, in addition, create other goals. In this section, we will proceed sequentially, using the version of the Planner available at the beginning of 1997.

Personal

In this category, there are three upper tabs labeled “You,” “Spouse,” and “Children.” Thus, it is possible to create a financial plan for an individual, a couple, or an entire household. For the respondent and spouse, the name and birth dates are requested, as is the desired retirement age for each. The retirement age is described as when retirement benefits start, for example, social security, and it is also the default age for when labor income ends. The Planner next asks questions about self-reported health, gender, and smoking status to determine the respondent’s and spouse’s life expectancies. A life expectancy is returned by the program, which the Planner encourages the respondent to increase manually by 10 years to allow for the possibility of living beyond the average life expectancy. Whatever age is entered determines the length of the retirement period for later use in the plan. Finally, the names and birth dates of dependent children are requested.

Income

This right-hand tab has two upper tabs, “Salaries” and “Special Income.” In “Salaries,” current and expected future labor incomes are requested for the respondent and spouse. In particular, for each current and expected future job, salary (in today’s dollars), expected dates of tenure, expected rate of increase in salary, employment status (regular or self-employed), and payroll tax status are requested. If a significant promotion is expected, it would be entered separately as a future job. Similarly, temporary non-participation in the labor force can be recognized. As mentioned above, the default ending date for a job is the desired retirement age, but this may be overridden. In “Special Income,” gifts, inheritances, royalties, and distributions from trust funds may be entered. Either a one-time transfer or a flow of income may be recorded in today’s dollars, at any expected future date(s).

Taxes and Inflation

This category has three upper tabs, “Income Taxes,” “Other Taxes,” and “Inflation.” In the “Income Taxes” tab, the respondent inputs combined
federal and state average income tax rates, before and after retirement, for the household. The respondent is given a choice of two methods to do the estimation. One is a "demographic average," the average tax rate paid by the average person in the respondent's state of residence with the same level of household income; the other is the "tax return" method, where an average tax rate is calculated based on the household's adjusted gross income and the actual taxes paid last year, as reported on federal and state tax returns. The respondent is then asked to input the average tax rate he or she expects to face in retirement; the program advises that the pre-retirement tax rate be used unless it is expected that income will drop significantly in retirement. Whether before or after retirement, the respondent is told by the Planner to avoid inputting a marginal tax rate.

In the "Other Taxes" tab, the Planner explains how social security and Medicare taxes are automatically reflected in the program's calculations. Finally, the "Inflation" tab shows a chart with historical inflation rates since 1927, and counsels that a 3 percent inflation rate is a reasonable estimate of future trends, given past experience; the respondent can, however, select any desired inflation rate from 0 to 20 percent.

Saving

This major tab has three upper tabs, labeled "Tax-deferred," "Taxable," and "Investments." In the "Tax-deferred" tab, the respondent inputs both spouses' planned contributions to all types of tax-advantaged accounts, including 401(k) and 403(b) plans, IRAs, and Keogh plans. In addition, employer contributions to such plans are captured here. In particular, for each active tax-advantaged plan, the respondent is asked over what period contributions will be made, the level of employee contribution (in percentage or dollar terms), and the level of employer contribution (as a match, up to what limit, and/or any profit sharing). The direct limitations of the Internal Revenue Code on contributions are automatically imposed; limitations arising from the operation of non-discrimination requirements at the plan level, however, are not imposed. Similar questions are posed in the "Taxable" tab for taxable regular saving plans, such as Christmas clubs, EEE government savings bond plans, and so on.

In the "Investments" tab, details are entered about the holdings of financial assets separately for tax-deferred and taxable accounts, by major asset classes, such as stocks, bonds, money market funds, guaranteed investment contracts, and so on. One can enter these holdings either as a rough estimate, where the asset class designations are ignored, or as an itemized list, where the asset class designations are requested; if a mutual fund is entered, Morningstar performance and star-rating information is available.23
Assets

In this category, information about nonfinancial assets of the household is entered in three separate tabs, “Homes,” “Life Insurance,” and “Special Assets.” In the “Homes” section, information about each primary residence currently owned or planned to be owned is requested. In particular, the Planner asks for the expected length of stay in the home, the purchase price and date, the current market value, the expected rate of increase in value, annual expenses and property taxes incurred, rental income, and any mortgages secured by the property, including original loan balance, interest rate, and term. In the “Life Insurance” section, information about any term or cash-value insurance policies is requested, including the policy’s start and end dates, death benefit, annual premium, and, if relevant, cash value (currently and at retirement). In the “Special Assets” section, information about assets which produce income or can be sold to fund retirement, such as businesses, vacation homes, other real estate, and so on, is requested; the specific questions here are similar to those asked in the “Homes” section of the Planner. Unless specified by the respondent, however, the Planner will not sell either homes or special assets to fund retirement. There are no questions in the Planner concerning personal property because such property is not expected to be sold at any time or in any circumstance.

Loans

This category has one upper tab, labeled “Loans.” The Planner asks the respondent to enter information about current loans and any major loans anticipated in the future. Relevant loans include auto loans, business loans, and loans to pay for college expenses for the respondent, spouse, or children. Credit card payments should be included in expenses (see next major tab), and mortgages have already been entered. The Planner asks for each loan, its start date, original and current balance, interest rate, term, frequency of payments, and whether any balloon payments are expected. It can calculate the current principal and interest payments and the current balance if sufficient information is input.

Expenses

This major tab has three upper tabs, “Living Expenses,” “College Expenses,” and “Special Expenses.” In the “Living Expenses” tab, the respondent has a choice between two methodologies for estimating household’s expenses for food, clothing, uninsured medical bills, credit card payments, and so on: the “Rough Estimate” and the “Itemized List.” In the Rough Estimate approach, the Planner simply asks for the respondent’s estimated living expenses be-
fore and after retirement. As guidance, the Planner provides an abbreviated statement of cash flow subtracting payments for taxes, loans, housing, insurance premiums, and savings from current income to arrive at a remainder available for living expenses. In the "Itemized List" approach, the respondent is invited to enter self-defined categories of expenses with start and end dates and annual amounts. The Planner then totals pre-and post-retirement living expenses from this list.

In the "College Expenses" tab, the Planner asks for parents' plans for each child's college education. It requests information about the expected age of college entrance, the duration of college, the name of the institution to be attended, the expected rate of tuition inflation, anticipated annual financial aid, and expected annual student and gift contributions to the cost of college. For each institution of higher education drawn from a fairly comprehensive list (ordered by state, separately for public and private), the Planner provides current tuition and fees, additional out-of-state tuition, room and board, books and supplies, and other expenses. In the "Special Expenses" tab, the respondent enters expenses for weddings, vacations, and other large purchases, whether current or anticipated, one-time or continuous.

Retirement Benefits

This category has two upper tabs, "Social Security" and "Pensions," where periodic post-retirement payments from social security and employersponsored defined benefit pension plans are estimated. The age at which benefits begin defaults to the retirement age entered in the "Personal" tab, described above. Under the "Social Security" tab, respondent and spouse estimate their anticipated social security income using one of two methods: the "Rough Estimate" or the "Social Security Administration Estimate." The rough estimate method asks in which of four earnings bands the respondent and spouse expect to find themselves; an estimate of social security income is then produced based on those answers. Income is adjusted for the expected retirement age according to the social security benefit formula. Under the Social Security Administration estimate method, the respondent inputs social security income from the official response to the Request for Personal Earnings and Benefits Estimate Statement form mailed to the Social Security Administration. Finally, the respondent is allowed to reduce the estimate of future social security income to reflect views of likely future policy changes in the program. The "Pensions" tab asks the respondent and spouse to enter anticipated yearly benefits from employer-sponsored defined benefit plans, if any (in today's dollars). The Planner also asks whether benefits will be adjusted to reflect the cost of living and whether the spouse will receive benefits upon the death of the respondent.
In the “Return” section, there are three tabs: “Risk & Return,” “Before Retirement,” and “After Retirement.” In the “Risk & Return” tab, basic investment information is provided, highlighting the historical annual returns experienced on various asset classes and the variability of those returns. The respondent is asked to select the portfolio returns he or she believes are achievable given general risk preferences and investment time horizon. The returns selected may differ before retirement and after retirement. One of 10 model portfolios is shown for each return selected (at 50 basis point intervals) between 5.5 and 10 percent. The Planner relies on Callan Associates, an independent investment consulting firm, to estimate an efficient investment frontier to develop these portfolios. It is also important to note that the Planner uses the selected return in its calculations, not the expected return which would result from the actual portfolio held by the respondent and spouse, as entered above in the Saving/Investments tab.

Advanced Planning Options

In the Planner menu there is a general function called “Advanced Planning Options” with five tabs: “Cash Shortfalls,” “Investment Mixes,” “Realized Gains,” “International,” and “Sweep.” These functions allow for quite sophisticated modeling by the respondent. In “Cash Shortfalls,” the respondent is asked about plans to sell investments (tax-deferred or taxable) to cover pre-retirement shortages; the default answer is No. In “Investment Mixes,” the respondent is asked whether the same selected return should apply to the three portfolios: “Self Tax-deferred,” “Spouse Tax-deferred,” and “Taxable”; the default answer is Yes. In “Realized Gains,” the respondent is asked what percentage of the gains in the taxable portfolio will be subject to income and capital gains taxes every year; the default answer is 100 percent. In “International,” the respondent is asked whether international stock and global bonds should be included in the investment mix; the default answer is Yes. Finally, in “Sweep,” the respondent is asked what percent of surplus cash flows are swept into taxable savings; the default answer is 0 percent.

Results

This major tab contains four upper tabs, “First Glance,” “Assumptions,” “Forecasts,” and “What If.” In “First Glance,” the respondent is told the good or the bad news: whether he or she can anticipate having the money needed to retire. If the news is bad, a brief statement of the nature of the problem is given, including the year when assets are depleted. Regardless of
the nature of the news, a graph of the life cycle of the household portfolio value is shown on the screen.

In the next tab, “Assumptions,” the respondent can review all inputs and assumptions; the program also provides more information about problems that the household might encounter in the plan and offers hints for solving some of those problems. The Planner automatically makes appropriately sized withdrawals from tax-deferred accounts in accordance with the minimum distribution requirements of the Internal Revenue Code and IRS regulations, if that is indicated after the respondent and spouse turn age 70½.

In the “Forecasts” tab, graphs, tables, and narrative descriptions of the household’s situation are available in the following areas: Portfolio Value, Net Worth, Cash Flow, Income, Expense, Savings, and Withdrawals. It should be noted that the Planner defines net cash flow in a unique way: it is the surplus or deficit produced by the planned sources and uses of annual money flows. If the advanced planning option of not selling assets is chosen, a deficit is not financed, and if the sweep option is not activated, a surplus is not invested; rather, the respondent is simply alerted by the Planner to deficit problems.

In the “What If” tab, a bar is shown indicating the percent of years of retirement funded; green shows the years funded, red shows the years with a shortfall. Below the bar is a listing of assumptions that can be changed (“what ifs”) to improve the performance of the plan. There is a “Solve It” function key on the notebook page, which produces the exact change necessary in a particular assumption to result in a successful plan, that is, a fully financed retirement. The “Solve It” functions key operates one assumption at a time; there is no way to automatically make changes in several assumptions simultaneously, although this can be done manually. By trial and error one can then arrive at a fully funded retirement. The variable assumptions include the retirement ages, portfolio returns, saving contributions, percent of post-retirement living expenses covered, and life expectancies.

Action Plan

The final major tab, “Action Plan,” contains the following upper tabs: “Summary,” “Action Steps,” “Insurance Needs,” and “Print Plan.” “Summary” shows a screen with the Plan Summary of the plan incorporating whatever changes were made in the prior section of the program. “Action Steps” highlights the saving and investment schedules needed to implement the chosen financial plan and to follow the Planner’s asset allocation advice; it also offers some generic advice on estate tax matters. “Insurance Needs” is an independent calculator that uses data already inputted and asks for preferences on the size of a desired estate and other post-mortem expenses; it then gives advice on the optimal amount of term life insurance to have. Fi-
nally, "Print Plan" encourages the respondent to print out the complete plan, which contains the graphs and narrative of the type already exhibited as well as a year-by-year schedule of saving and investment needed to make the plan work.

Critiques

The Quicken Financial Planner is quite comprehensive and one of the best we have seen among planning packages available to the general public. However, it is not without faults, logical inconsistencies, and scope for improvement. Some of these improvements would be easy to accomplish; others, however, would require more work.

We believe that the Planner should regard both life expectancy and risk tolerance as facts rather than changeable assumptions. We can construct an example of the program's somewhat odd results when the life expectancy of the spouse is allowed to change to enable the respondent to achieve a fully financed retirement. More specifically, through the "Solve It" key, the Planner allows a radical reduction in life expectancy; this change works because it reduces the length of the retirement period, and the default assumption is that an individual can live on 80 percent of what a couple needs to live. The Planner, however, is not really advocating divorce or murder because it still assumes that the spouse's salary, pension contributions, and investments are included in the plan. Similarly, it is much too easy to achieve success in the program simply by increasing portfolio return. The consequences of such a change in terms of risk are not presented clearly enough to caution against such a "quick fix."

Regarding life expectancy, the Planner does not really consider the uncertainty of the length of life, and therefore, the need for annuitization of retirement assets. It is true that the use of life expectancy plus 10 years to estimate the expected period of retirement is fairly conservative. This assumption, however, can lead people to have an unnecessarily low standard of living before and during retirement because of the need to husband resources to finance a longer than expected period of retirement. Furthermore, it can lead to insufficient assets if the respondent and spouse live to extreme old age or to unused assets on death if their lives are of average length.24 Also, the Planner does not consider explicitly the significant financial risks facing an aging household from uninsured health and long-term care expenditures. Although an estimate of average expenditures for such needs could be inputted, it is currently impossible for the Planner to evaluate reasonable ranges for such expenditures. Therefore respondent and spouse may remain unaware of the need for long-term care and Medigap insurance. Taking this thought further, the Planner should ask whether either spouse has or expects to have retiree health insurance from an employer, and it should then make the appropriate adjustments to projected expenses.
Because of its actuarial nature, the Planner’s “What If” function does not optimize by changing borrowing and saving behavior over the life cycle to achieve the appropriate level of assets to have on hand when retirement begins. The program does allow a respondent to input different saving rates at different ages, and similarly to experiment with taking out loans of varying amounts at varying times, but the program does not suggest or encourage such an approach to planning. Varying borrowing and saving rates at different stages in the life cycle is especially appropriate if income and/or expenses vary significantly over the life cycle. It makes little sense to maintain the same rate of contributions to a 401(k) plan during an early financially stressful period as during later working years when household income may be higher and one-time expenses are lower.

If the household faces a cash flow problem even after selling taxable investments and taking out loans, say to finance its children’s college education, the Planner can have the family dip into tax-deferred investments, thereby incurring a 10 percent penalty tax, as well as the payment of state and federal income taxes on the withdrawal. Yet if the household owned and occupied real estate, it would clearly be preferable to borrow against home equity; the interest on such a loan is deductible from income taxes.

The Planner provides a wealth of information about the cost (including tuition, room and board, books, and so on) of attending hundreds of different colleges and universities. Yet for most people using the Planner their horizons presumably are sufficiently long that they do not know which type of college (public or private, two-year or four-year) their children will attend, let alone the specific identity of the school. Furthermore, many households do not pay full tuition, being assisted by grants, loans, scholarships, and so on. Therefore, despite the detailed information it provides, the Planner is not sufficiently realistic about financing higher education. A better approach might be for the Planner to offer the respondent a choice of precise or ballpark estimates, similar to that offered for the social security benefit calculations.

The Planner is not truly dynamically consistent in expected rates of return. Although it allows for one rate of return during the working years and another during the retirement period, the Planner does not consider changes in expected rates of return arising from likely changes in portfolio holdings caused by aging, expected growth in wealth or income, maturing of children, lack of consistent rebalancing of assets, and so on.

The Planner uses the respondent’s planned or desired rate of return on investments in its calculations. This rate of return is not necessarily related to the actual current portfolio composition of the responding household, and thus may lead to an underestimate or, more likely, to an overestimate of the household’s ability to finance retirement. Probably a better approach would be to ascertain, either through information obtained about current portfolio composition or by direct question, the household’s expected re-
turn on its current investment portfolio. Then a few questions could elicit the household's risk preferences and an efficient portfolio could be suggested (see Barsky et al. 1997).

Finally, the Planner does not employ the technology of stochastic intertemporal financial economics, as appears, for example, in Merton (1971), Breeden (1979), Cox and Huang (1989), and Bodie, Merton, and Samuelson (1992). Such a technology would combine the stochastic natures of asset returns, labor income, and consumption expenditures with the risk preferences of the respondent to produce an optimal financial plan. Clearly, the absence of uncertainty in financial planning programs now on the market is a major defect, because the appearance of certainty makes things look better than they are likely to be. Furthermore, significant uncertainty pertains to important public policies, such as taxes and government-sponsored retirement income and health programs, as well as to market and individual household risks factors. It must be admitted, of course, that stochastic technology needed to handle uncertainty has yet to be implemented for practical use.

Nevertheless, we do what we can with what is available—and we believe that results obtained with the Quicken Financial Planner offer results better than many other models. In particular, the Planner considers many more “real life” factors, such as financing for children's education, than do other models.

The authors thank Dennis Kwong, John Adams, and Jim Safka at Intuit for their assistance in processing the Survey of Consumer Finances data files through the Quicken Financial Planner testing program. They also thank Eric Engen, William Gale, Ron Gebhardtbsauer, Larry Kotlikoff, Joyce Manchester, Jim Poterba, Anna Rappaport, Martin Feldstein, and seminar participants at the Federal Reserve Board, the Pension Research Council, and the NBER Summer Institute for helpful comments, discussions, and suggestions. Opinions expressed are those of the authors and do not necessarily represent the views of TIAA-CREF.

Notes

1. See Radner (1998) and Moore and Mitchell (this volume) for additional economics studies on retirement preparedness.

2. An economic model that can be reconciled with the actuarial approach is the theory of self-control advanced by Thaler and Shefrin (1981), which posits that people are simultaneously farsighted planners and myopic doers. Hence they resolve their inner conflict by self-imposed rules that restrict the “doer's” opportunities and reactions. Empirical evidence suggests that this self-control theory does reflect the ethos of many financial planning packages (Warshawsky 1987).

3. Kotlikoff and Bernheim have a software package called “Economic Security Planner” that employs an economic approach to retirement planning. Here life
insurance and savings recommendations are based on what the household needs to maintain its living standard under different mortality contingencies, through different stages of the life cycle, and in light of particular planned expenditures, such as financing a child’s college education. Other unique features include the conceptual integration of life insurance and saving decisions, and the display of the consequences of alternative insurance and saving decisions; these features demand a sophisticated optimization algorithm.

4. For more detail on the QFP see the Appendix.

5. These tabulations use the entire 1992 SCF sample. As described below, our QFP work uses only data from the first implicate of the SCF sample, so the numbers in Table 1 may vary slightly from these statistics.

6. The results of the exercise are similar when these individuals are included.

7. One reason for exclusion — because “respondent or spouse has future job” — is attributed to an error in the input file discovered after the study was completed. We hope to correct this in ongoing research but do not anticipate that adding such cases will change our results. Because non-response is an important problem in the context of wealth surveys, the SCF designers have used a “multiple imputation” process to deal with missing data since 1989. This procedure requires that the dataset contain multiple copies of the responses of each interviewed household, called implicates, which differ from one another in terms of imputed data. This methodology multiplies the number of observations in the final public use dataset by a factor of five for example, 3,906 households responded to the 1992 survey, but there are 19,530 implicates. Processing more than about 1,500 observations through the procedure we have outlined would have been impractical. As a result, in this chapter we use only the first implicate for each household in the dataset. The statistical validity of the analysis is served better by taking the average of the values of each SCF data item across all implicates, but where the Planner required a discrete answer regarding ownership of certain assets or types of assets, we cannot use the average of the implicates.

8. The Health and Retirement Study (see Chapter 1) contains much useful data relating to retirement finance; we did not use that dataset here because we sought data on households of all ages, rather than only those nearing retirement.

9. For example, Question 45(11) of the SCF asks individuals with full-time jobs: “Thinking now of the future, what year do you expect to stop working full-time?” A similar question is asked of individuals working part time who are planning to return to full-time work.

10. An alternate formulation of the question posed to full-time workers might result in a higher response rate to the retirement question. For example, it would be helpful to follow up individuals who claim that they will never stop working full-time by asking if or when they ever anticipate significantly reducing the total number of hours spent at their job per year in the future. For those who provide a valid answer, it would be worth learning why they will stop working full-time (retirement, childcare, or other).

11. These age-earnings profiles are drawn from Murphy and Welch (1990).

12. While core questions are asked about each type of loan, slightly different information is collected for each different type of loan, and there are many areas where responses can invalidate the answers.

13. In a small number of cases, this balance was negative; i.e., individuals could not fund all these payments out of current earnings, and these cases were dropped from the sample. This is generally due to the existence of large loan payments for people with substantial income from sources other than earnings.
14. The SCF does contain information about social security benefits currently received. However, since the QFP provides its own estimates of social security benefits, we use that information here.

15. We include lump-sum pension benefits as one-time “special income” rather than as pension income. One unresolved issue with the SCF data was whether the respondent factored inflation into estimates of future pension benefits. The SCF asks the individual to report the benefit amounts as “as a percentage of pay at retirement or as an amount when you start receiving them.” We assume that the amount responses were in real 1992 dollars and that the benefit amount increased with inflation until benefits began to be received from that point onward, we assumed no nominal benefit increase. We did not consider inheritances in the analysis because the SCF data were imprecise on this point.

16. Excess cash flow is generated when income is greater than all expenses plus planned saving.

17. With regard to the financial data, the households had median total income of $37,000. This is based on household responses to the SCF query regarding income received in 1991. In the 1992 SCF sample (representing 96 million households), median household income was $26,000.

18. Median net worth (including defined contribution pension assets) for the entire 1992 SCF sample was $50,000.

19. We were somewhat surprised by the result that 11 percent of the sample had no financial assets in 1992. As a check, we tabulated financial asset values for the entire 1992 SCF population (96 million households) where we found that approximately 9.2 million households (9.6 percent) had no financial assets, a result that is not too different from that reported in the text.

20. The sensitivity of this measure was checked by adding 10 years to the QFP’s suggested life expectancy assumptions; it is interesting that only three percent of the sample had plan failures in the final decade of their plan. While changing the life expectancy assumption would not necessarily result in exactly a 3 percent reduction in the failure rate (this change alters several parameters in the model), we are confident that the impact of the life expectancy extension on the overall rate of failure is relatively minor.

21. Recall that in this category, college expenses are assumed to be covered by the student’s own contributions and financial aid; therefore the plans cannot fail before retirement as a result of college expenses. Since the success rate is generally rising until the time of retirement, it is also the case that among individuals in this category, those whose plans begin closer to retirement are more likely to have at least some financial assets.

22. It is important to note that we use no real discount rate in these calculations (a year of living expenses 10 years after retirement is given the same dollar value as the first year of living expenses after retirement.)

23. In the Planner menu a “Mutual Funds” function is also available, which provides a tool for selecting mutual funds meeting respondent-determined criteria, such as star rating, manager tenure, minimum investment, and so on, in the asset classes (basic or extended) chosen. In addition, some general guidance about selecting mutual funds is given.

24. In recent research, Mitchell, Poterba, Warshawsky, and Brown (forthcoming, 1999) offer an economic model of the “consumer surplus” created by life annuities, and they compare this surplus with the load factor experienced by the average consumer if he or she were to purchase commercially available single-premium immediate life annuities.
References


Moore, James and Olivia S. Mitchell, "Projected Retirement Wealth and Savings Adequacy." This volume.


