Financial Services Review 7 (1998) 195–206

FINANCIAL SERVICES REVIEW

Calculating a family's asset mix

William Reichenstein*

Baylor University, Hankamer School of Business, P.O. Box 98004, Waco, TX 76798-8004, USA

Abstract

Two conclusions are reached about how a family should calculate its asset mix. First, if the assets will be used to finance retirement needs, the asset mix should be based on after-tax values, because goods and services are purchased with after-tax dollars. This novel conclusion rejects current practice. The second conclusion concerns which assets and liabilities should be included in the portfolio. If the purpose of the calculation is to consider a family's retirement needs, the asset mix should include the promises of defined-benefit pension plans and Social Security, and the family's mortgage should be treated as a short bond position. Also, if the family is willing to downsize or borrow against the residence, part of its value should be included in the portfolio.

1. Introduction

There is wide agreement that the asset allocation decision is the most important investment decision an individual or family will make. How the family breaks up its portfolio between stocks, bonds, and, perhaps, other asset classes is more important than the choice of individual securities within each asset class (see Brinson et al., 1986; Reilly and Brown, 1997; and Sharpe, 1990, to name but a few). From this perspective, one would think that there is wide agreement about how the family should calculate its asset mix. In reality, there has been surprisingly little written on this issue. The goal of this paper is to begin to address this question in a rigorous fashion. In this paper, I present the financial position of a hypothetical but typical family. I then ask, what is the best view of its asset mix? The calculation of its asset mix depends upon answers to two questions. First, what assets and

* Corresponding author. Tel.: +1-254-710-6146; fax: 1+-254-710-1092.
E-mail address: Bill_Reichenstein@baylor.edu (W. Reichenstein)

1057-0810/98/$ – see front matter
PII: S1057-0810(99)00011-6

liabilities should be included in the portfolio? Second, should the assets and liabilities be expressed in market values or in after-tax values? I address the second question first. If the assets are intended for income needs during retirement then I believe the asset mix should be based on after-tax values, because goods and services are purchased with after-tax dollars. Current practice advocates the use of market values. So, if my thinking is correct the profession has been miscalculating families' true asset mixes, and the measurement errors can be substantial.

The other question asks what should be included in the portfolio. I present the hypothetical family's asset mix based on several views of its portfolio—that is, decisions about what to include. The narrowest view includes financial assets only. Broader views consider the family's personal residence and mortgage, promises of a defined-benefit pension plan, or both. I then ask, what is the best view of its portfolio?

2. Pre-tax and after-tax dollars

For simplicity suppose Mr. and Mrs. Jones have $1 in a stock fund held in a deductible pension plan and $1 in bonds held in a taxable account. The deductible pension plan could be any plan where the contribution is tax deferred. These include the deductible IRA, 403(b), 401(k), Keogh, SEP-IRA and others. The cost base and market value of the bonds are $1. What is their asset mix? Based on market values, it is 50% stocks and 50% bonds. The use of market values ignores the fact that the pension account contains pre-tax dollars and the taxable account contains after-tax dollars.

The Joneses must pay for goods and services with after-tax dollars. The $1 in the pension will buy fewer goods than the $1 in the taxable account. *Assuming the funds are to be used to buy goods and services during retirement* then the market value of pension assets must be converted to after-tax values. This is done by multiplying pension assets by the factor $(1 - t_n)$, where t_n is the expected tax rate in retirement. (The used-during-retirement assumption allows us to ignore estate-planning issues.)

Suppose the expected return on stocks is k% and the funds will be withdrawn in retirement in n years. The expected pre-tax value of the pension in retirement n years hence is $\$1(1 + k)^n$. If the expected tax rate in retirement is 35% then the expected tax liability at time n is $\$0.35(1 + k)^n$. To find the present value of this tax liability we must determine the appropriate discount rate. This tax liability increases and decreases with the value of the pension asset. So, the riskiness of the tax liability is precisely equal to the riskiness of the pension asset. Discounting this expected tax liability at k% for n years reduces its present value to $0.35; that is, $\{\$0.35(1 + k)^n\}/(1 + k)^n = \$0.35$. So, we can convert the $1 of pre-tax pension assets to an after-tax basis by multiplying by $(1 - t_n)$.

Similarly, if $1 of bonds are held in the pension account, the expected pre-tax value of the pension n years hence is $\$1(1 + i)^n$, where i is the expected return on the bonds. The expected tax liability n years hence is $\$0.35\ (1 + i)^n$. Discounting at i percent for n years reduces the present value of the expected tax liability to $0.35. The argument that the discount rate for the tax liability should be k% for stocks and i% for bonds is essentially the

Table 1
The Smith's Assets and Liabilities in Market and After-Tax Values

Asset	Market Value	After-Tax Value	Savings Vehicle
Financial assets			
Exxon stock	$ 15,000	$ 12,300	Taxable Account
Stock fund	$165,000	$107,250	Deductible Pension
Bonds	$ 50,000	$ 50,000	Taxable Account
Bonds	$ 70,000	$ 63,000	Tax-Deferred Annuity
Total	$300,000	$242,550	
Other assets and liabilities			
Home	$250,000	$250,000	
Mortgage	$200,000	$200,000	
Insurance: Cash value	$ 60,000	$ 51,250	
Contingent assets			
Insurance: Death Ben.	$195,000	$195,000	
Defined-Benefit Plan	$300,000	$195,000	

same as Modigliani and Miller's (1958) capital-structure argument that the discount rate for the tax savings from debt should be the debt's interest rate.

If the expected tax rate in retirement is 35%, the Jones' after-tax asset mix is $0.65 stocks and $1 bonds, or 39.4% stocks and 60.6% bonds. Before calculating the current asset mix, one must first convert deductible pension assets to after-tax dollars by multiplying by the factor $(1 - t_n)$, where t_n is the expected tax rate in retirement. Generalizing, it is not appropriate to calculate the asset mix until all investments have been converted to an after-tax basis. This perspective was first presented in Reichenstein (1999). This article extends that work.

The next section presents the financial position of a hypothetical but typical family. It then explains how market values of assets held in deductible pensions, tax-deferred annuities, and taxable accounts can be converted to after-tax values.

3. The Smith family

Mary and Bob Smith, both age 65, have no children remaining at home. Bob recently retired from EDS after 30 years of service. The Smiths moved frequently during Bob's career. They have lived in Albuquerque for the past seven years. They are in the combined state-plus-federal 35% tax bracket and expect to remain in that bracket after retirement.

Table 1 presents the financial position of the Smiths. They hold $15,000 of Exxon stocks in a taxable account. It has a cost base of $5,000. They have a stock fund worth $165,000 that is held in a deductible pension. Corporate bonds, with a cost base and current market value of $50,000, are held in a taxable account. They have $70,000 in a bond subaccount held in a nonqualified tax-deferred annuity; it was funded five years ago with a $50,000 investment and has accumulated $20,000 of tax-deferred interest. Table 1 presents this asset as a $70,000 bond held in a tax-deferred annuity.

They bought a house seven years ago for $150,000. It is currently worth $250,000, and it was recently refinanced with a $200,000 fixed-rate mortgage. The EDS defined-benefit (DB) plan will pay Bob $26,000 a year for the rest of his life. If Bob dies first, it will pay Mary $13,000 a year for the rest of her life. For simplicity, I accept the IRS' current assumption that they each have 20-year life expectancies and assume that the present value of $26,000 a year for 20 years is $300,000; the discount rate is 5.93%. If Bob dies today, the present value of Mary's $13,000 a year for 20 years is $150,000. The present value of the DB plan should reflect the joint probability distribution for Bob and Mary's life expectancies. I leave this detail to future researchers. The benefits are fully taxable and, therefore, are worth $195,000 and $97,500 after taxes [e.g., $300,000(1 − 0.35)]. Mary is the beneficiary of a $195,000 life insurance policy on Bob. It has a cash surrender value of $60,000.

Table 1 presents the after-tax values of the Smith's assets assuming that during retirement they will have a combined federal-plus-state tax rate of 35% and a combined capital gains tax rate of 27%. To repeat, the Smiths must buy goods and pay for services with after-tax dollars. Calculating the asset mix based on market values implicitly assumes that their expected tax rate in retirement will be zero. The Smiths may not be certain what their retirement tax rate will be, but the implicit expectation of zero is clearly less than optimal.

The Exxon stock is held in a taxable account and has a cost base of $5,000. Based on the 27% tax rate, the $10,000 capital gain is worth $7,300 after taxes. So, the stock is worth $12,300 after taxes—the original $5,000 plus the $7,300 capital gain.

The before-tax value of an asset with an unrealized capital loss should also be converted to an after-tax value. Suppose a capital asset has a cost base of $10,000, a market value of $7,000, and the loss will be realized this year while the family is in the 35% marginal tax bracket. The after-tax value of the asset is $8,050, that is, $7,000 + $3,000 (0.35).

As discussed earlier, the $165,000 of deductible pension assets converts to $107,250 of after-tax assets, [$165,000 (1 − 0.35)]. The $50,000 of bonds held in a taxable account is already after-tax dollars. In this case, no difference exists between the cost base and the current market value. If a difference exists, however, one should convert the unrealized gain or loss into an after-tax equivalent.

The bond subaccount held in a nonqualified tax-deferred annuity is a hybrid asset consisting of pre-tax and after-tax funds. In essence, it is a bond that is subject to the tax structure facing tax-deferred annuities. The original investment of $50,000 is after-tax funds. The $20,000 of tax-deferred interest is before-tax funds. It converts to $13,000 of after-tax funds. So, the annuity is worth $63,000 after taxes.

Current tax law allows the exclusion of up to $500,000 in capital gain on a family's personal residence. So, no taxes are expected on the $100,000 unrealized capital gain, and the pre-tax and after-tax values of the personal residence are $250,000.

The mortgage is a short bond position. The family should calculate the after-tax value of the mortgage. The Smiths recently refinanced their home. So, the market value of the $200,000 mortgage is approximately equal to its book value. And, the $200,000 book value is an after-tax liability. A family may have a fixed-rate mortgage with a below current-market interest rate. If so, the market value of the mortgage would be less than its book value.

The $60,000 cash surrender value of the death benefit is a hybrid security. Part of it—I assume $35,000—represents principal, which is after-tax dollars. The remaining $25,000 is

Table 2
Views of the Asset Mix

Portfolio View	Stocks	Bonds	Real Estate
Market Values			
Financial Assets Only	60.0%	40.0%	0.0%
Home Equity	51.4%	34.3%	14.3%
After-Tax Values			
Financial Assets Only	51.4%	48.6%	0.0%
Home Equity	42.3%	40.0%	17.7%
Balance Sheet[a]	42.3%	−30.8%	88.5%
Scott[b]	25.0%	75.0%	0.0%
Cash Flow[c]	42.9%	57.1%	0.0%
Expanded[d]	27.9%	37.1%	35.0%
Estate Planning[e]	20.8%	35.7%	43.5%

[a] In thousands of after-tax dollars, stocks include $12.3 + $107.25. Bonds are $50 + $63 − $200 mortgage. Real estate is $250. Total net worth is $292.55.

[b] In thousands, the stocks are worth $119.55 and the bonds are worth $50 + $63 + $51.25 + $195 or $359.25 after taxes.

[c] In thousands, the stocks are worth $119.55 and the bonds are worth $159.25 or $50 + $63 + $51.25 + $195 − $200.

[d] In thousands, stocks are worth $119.55. The bonds are worth $159.25 or $50 + $63 + $51.25 + $195 − $200. Real Estate is worth $150.

[e] In thousands, stocks are worth $119.55. Bonds are worth $50 + $63 + $195 + $97.5 − $200 or $205.5. Real estate is worth $250.

accumulated interest, which is pre-tax dollars. The after-tax value of the cash surrender value is $51,250.

4. Calculations of the asset mix

Table 2 presents calculations of the Smiths' stocks-bonds-real estate asset mix based on several portfolio views, that is, views about what to include in the portfolio. The first two views use market values. They are included to represent traditional approaches of calculating the asset mix and to serve as benchmarks for the corresponding after-tax asset mixes.

The first two portfolio views are the ones used by Peavy and Sherrerd (1990) throughout *Cases in Portfolio Management*. They use market values to calculate a family's asset mix, a practice followed throughout the profession. *Cases*, with its guideline answer, serves as the capstone to the three-year Chartered Financial Analysts program. In addition, the Surveys of Consumer Finance and Survey of Income and Program Participants use market values when calculating a family's asset mix (see Kennickell et al., 1997, and Poterba et al., 1994). They make no distinction between the before-tax dollars in family's Keogh accounts, 401(k) plans, and so on and the (usually) after-tax dollars in family's taxable accounts. Similarly, studies that examine a family's retirement preparedness typically compare projected consumption with projected sources including before-tax payments from defined-benefit pension plans and Social Security. No adjustment is made for taxes on pension and Social Security benefits.

Yet, consumption expenditures use after-tax funds while defined-benefit plans and Social Security provide before-tax funds. Yuh et al. (1998b) note this deficiency that exists in all prior studies, including their own, but as yet, no one has adjusted for it. These examples demonstrate that the profession currently advocates the use of non-tax-adjusted, market values when calculating the asset mix and the adequacy of retirement income.

I call the first view the market-value Financial Assets Only View. As its name implies, it only considers the $300,000 market value of financial assets. It says the asset mix is 60% stocks, 40% bonds, and 0% real estate.

The second view, which I call the Home Equity View, considers the financial assets and the $50,000 of home equity. Prior studies that consider a family's preparedness for retirement usually include home equity as an asset. These include: Duncan et al. (1984); Burns and Widdows (1988, 1990); Li et al. (1996); Moore and Mitchell (1997); and Yuh et al. (1998a). Bernheim (1996) excludes house equity. This view ignores $200,000 of real estate value, the $200,000 mortgage, and the cash value of the insurance policy. According to this view, the Smiths' asset mix is 51.4% stocks ($180,000/$350,000), 34.3% bonds ($120,000/$350,000), and 14.3% real estate ($50,000/$350,000).

Table 2 also presents these same two portfolio views using after-tax dollars. The after-tax Financial Assets Only View considers the $242,550 of financial assets. It says the Smiths' asset mix is 51.4% stocks and 48.6% bonds. The after-tax Home Equity View adds the home equity to the financial assets. It says the Smiths' asset mix is 42.3% stocks, 40.0% bonds, and 17.7% real estate.

Let us first discuss the effects of substituting after-tax values for market values when calculating these two narrow asset mixes. At least three observations are noteworthy. First, using after-tax values reduces the stock weights in both narrow views by about 9%. A frequent rule of thumb says that each asset-class weight should remain within 10% of its target weight. That is, a 10% or larger deviation is considered substantial. By this standard, the inappropriate use of market values caused a nearly substantial measurement error. For many families, it would cause a substantial measurement error.

Second, advocates of the Financial Assets Only View claim to allocate the financial assets with an "appropriate recognition" of the outside real estate exposure. Such subjective treatment lacks precision. There may be as many interpretations of "appropriate recognition" as there are financial analysts. In short, this view is not wrong but it has clear limitations.

Third, I believe the Equity Only View is dead wrong. It implicitly assumes that the $200,000 mortgage serves as a perfect hedge for $200,000 of home value. Stated differently, it implicitly assumes that the values of the mortgage and home are perfectly correlated. In reality, their values do not move in unison. Moreover, this netting-out treatment is inconsistent with the way we treat other financial transactions.

Suppose someone borrows $4,000 to margin a $10,000 purchase of Intel stock. We would not say he has a $6,000 exposure to Intel stock. We would recognize that he has a $10,000 exposure. If Intel's stock price rises 20%, he gains $2,000. If it falls 25%, he loses $2,500. Similarly, if real estate values rise 20% the Smiths gain $50,000. The Smiths indeed have a $250,000 exposure to real estate, not a $50,000 exposure. This position may have been first presented in Reichenstein and Delaney (1995) and Delaney and Reichenstein (1996).

The fixed-rate mortgage is equivalent to a short position in corporate bonds. The Smith

family "issued" a $200,000 fixed-rate "bond." Suppose the $50,000 corporate bond in the Smiths' portfolio is an 8% coupon bond (that was bought at par and selling at par) and the mortgage has an 8% fixed rate. This bond offsets $50,000 of the mortgage. Both "bonds" have the same before-tax and after-tax interest rates and both are callable. The Smiths' true financial position is essentially the same whether they keep the corporate bond or liquidate it and prepay part of the mortgage. Suppose they liquidate the bond and prepay $50,000 of mortgage. According to the Home Equity View, this decreases their (net) bond position by $50,000 and increases their real estate by $50,000. In reality, (net) bonds and real estate are unchanged. The Financial Assets Only View counts the corporate bond as part of the portfolio but excludes the mortgage. Yet, they are offsetting. It makes no sense to include one but exclude the other. The mortgage is part of the family's financial assets; it is a negative asset or a liability. In short, neither view's treatment of the mortgage is adequate.

To clarify why it is *not* appropriate to net out the home and mortgage, consider the deductible pension, where it *is* appropriate to net out the before-tax market value of the pension assets and the tax liability on the pension. The market value of the pension is an individual's asset, its tax liability is his or her liability, and the values of the pension asset and pension liability are *perfectly correlated.* If the value of pension assets doubles, the liability also doubles. It follows that we can net out the pension asset and pension liability. That is, we can convert before-tax pension dollars to after-tax dollars by multiplying by $(1 - t_n)$. In contrast, the values of the home and mortgage are not perfectly correlated. If the home value rises 10%, the value of the mortgage does not rise a corresponding amount. In fact, historical returns on residential real estate and bonds have not been closely correlated. So, it is inappropriate to net out the two.

The Balance Sheet View removes this misrepresentation of the Smiths' portfolio. In particular, it includes the financial assets, the $250,000 home value, and treats the mortgage as a $200,000 short bond position. It excludes the defined-benefit pension plan and life insurance. According to the after-tax Balance Sheet View, the Smiths' asset mix is 42.3% stocks, −30.8% bonds, and 88.5% real estate.

The Scott View reflects the thinking of Maria Crawford Scott (1995), editor of the (American Association of Individual Investors) *AAII Journal*. She believes the "portfolio should consist of financial assets that you would be willing to sell for spending money or that generate some form of spending money, either now or sometime in the future" (p. 15). As such, she includes the present value of expected defined-benefit pension payments and the cash surrender value of insurance. (Actually, she considers the market values of these assets, but I substitute the after-tax values.) She excludes the home and mortgage. The home value is excluded because it is considered primarily a consumption good; it is prepaid housing. She says, "Most families do not purchase homes strictly for investment purposes. Usually, if you sell a home, you must buy another one to live in. If you plan to 'downsize' at some point, wait until you receive the sales proceeds, and then reassess and rebalance the portfolio" (p. 17). This view says the asset mix is 25.0% stocks and 75.0% bonds.

In reality, Scott (1995) and other studies advocate including the present value of *before-tax* Social Security benefits as part of the Smith's portfolio. I advocate using the present value of *after-tax* Social Security benefits. I choose to ignore Social Security in this theoretical paper due to its unique complexities at this time. For example, many individuals' Social Security payments

are reduced if their earned income exceeds a modest level. Will these restrictions continue? What changes do you expect in the Social Security plan, and what is the timing of the expected changes? What is the appropriate discount rate to calculate the present value of these risky government promises? What is the proper treatment of these (currently) inflation-indexed payments? In short, I agree with prior studies that a family should include the present value of Social Security payments in its portfolio. I differ with prior studies in that I would use the present value of after-tax payments instead of before-tax payments. In addition, I suspect that it is a lot more difficult than usually assumed to generate "good" estimates of the present value of a family's Social Security payments, either before or after taxes.

Although the Scott View has merit, I have two concerns about it. First, Scott's (1995) criterion for including or excluding an asset or liability seems to be whether it affects cash flows. She includes pensions and Social Security and excludes the home and mortgage. However, the mortgage affects cash flows. So, it seems to me that it should logically be included in this view.

Second, many individuals and couples expect to receive spending money from their home. For example, I know a couple who owns a home with an estimated market value of $750,000. When the first spouse dies, the survivor plans to sell the home and move to a condominium. In reality, their home contributes to an overexposure to real estate in their asset mix. Any view that ignores the home's value (or only considers it after the sale) would fail to recognize this overexposure.

I propose two modifications of the Scott View. The first I call the Cash Flow View. It is like the Scott View except it considers the mortgage. According to this view, the Smiths' asset mix is 42.9% stocks and 57.1% bonds. This mix differs substantially from the Scott View's asset mix of 25% stocks and 75% bonds. I believe the Cash Flow View provides a useful perspective for a family (or a surviving spouse) that would not be willing to sell the home or borrow against it. In particular, I agree with Scott (1995) that the home should be excluded when considering the Smiths' ability to pay for non-housing consumption needs during retirement. However, the Cash Flow View would not be appropriate if the family would be willing to sell the home or borrow against it.

The second modification of the Scott View is the Expanded View. Assume the Smiths expect to downsize and move into a $100,000 home. They should consider $150,000 of the $250,000 home as real estate and ignore the other $100,000. In essence, the $100,000 is prepaid housing. If the Smiths are willing to borrow against their home, they should include the home equity in the family's portfolio. The Expanded View includes financial assets, $150,000 of home, mortgage, cash surrender value, and present value of defined-benefit pension plan. This asset mix is 27.9% stocks, 37.1% bonds, and 35.0% real estate.

Table 2 also presents the Estate Planning View. It reflects after-income-tax values at Bob's death. It includes financial assets, the home and mortgage, the death benefit of Bob's life insurance policy, and the present value of the after-tax value of Mary's $13,000 a year payment from the DB plan. It excludes the cash surrender value. This view of the Smiths' asset mix is 20.8% stocks, 35.7% bonds, and 43.5% real estate. An Estate Planning View could also be developed for the less likely scenario that Mary should die first. It would exclude the death benefit but include the cash value of Bob's life insurance.

Table 3
Asset Mixes Across Three Financial Positions

Financial Positions	Stocks	Bonds	Real Estate
Financial Assets Only View			
Base	$119.55 (51.4%)	$113 (48.6%)	$0 (0.0%)
No DB Plan	$119.55 (51.4%)	$113 (48.6%)	$0 (0.0%)
No Mortgage	$119.55 (51.4%)	$113 (48.6%)	$0 (0.0%)
Balance Sheet View			
Base	$119.55 (42.3%)	−$87 (−30.8%)	$250 (88.5%)
No DB Plan	$119.55 (42.3%)	−$87 (−30.8%)	$250 (88.5%)
No Mortgage	$119.55 (24.8%)	$113 (23.4%)	$250 (51.8%)
Scott View			
Base	$119.55 (25.0%)	$359.25 (75.0%)	$0 (0.0%)
No DB Plan	$119.55 (42.1%)	$164.25 (57.9%)	$0 (0.0%)
No Mortgage	$119.55 (25.0%)	$359.25 (75.0%)	$0 (0.0%)
Cash Flow View			
Base	$119.55 (42.9%)	$159.25 (57.1%)	$0 (0.0%)
No DB Plan	$119.55 (142.7%)	−$35.75 (−42.7%)	$0 (0.0%)
No Mortgage	$119.55 (25.0%)	$359.25 (75.0%)	$0 (0.0%)
Expanded View			
Base	$119.55 (27.9%)	$159.25 (37.1%)	$150 (35.0%)
No DB Plan	$119.55 (39.2%)	−$35.75 (−11.7%)	$150 (49.1%)
No Mortgage	$119.55 (19.0%)	$359.25 (57.1%)	$150 (24.9%)

In the base financial position, the Smiths have a defined-benefit (DB) pension plan worth $195,000 and a $200,000 mortgage. In the no-DB scenario, they do not have the defined-benefit pension plan. In the no-mortgage scenario, they have paid off their mortgage.

5. Which portfolio view is "best"?

The answer to this question depends in part on the purpose of the calculation. Naturally, if the calculation is for estate-planning purposes then the Estate Planning View is best. But let us look at the range of asset weights from the other after-tax views, which assume the Smiths enjoy a happy retirement. Stocks' weight ranges from 25.0 to 51.4%. Bonds' weight ranges from −30.8% to 75%, or more than 100%. Real estate's weight ranges from 0% to 88.5%. These ranges are huge. Moreover, these dramatic differences are due entirely to differences in opinion about what belongs in the portfolio. Objections about how I calculate an asset or liability's value would not change the reality that the asset mix changes dramatically with the decision about what belongs in the portfolio.

Which view is best? One way to shed light on this question is to see if the asset mix changes substantially when the family's true financial position changes substantially. Table 3 presents asset mixes based on three substantially different financial positions. The base financial position is the one described thus far. The Smiths have a defined-benefit pension plan worth $195,000 and a $200,000 mortgage. In the no-DB-plan financial position, the Smiths have the $200,000 mortgage but do not have the DB pension plan. In the no-mortgage financial position, they have the DB pension plan but do not have the $200,000 mortgage; the mortgage has been paid off. I believe these three financial positions are substantially different. As such, I believe one test of a realistic portfolio view is that its asset mix should be substantially different for each financial position.

The Financial Assets Only View paints the same picture of the Smiths' financial position in all three scenarios. The Balances Sheet View paints the same picture whether or not Bob Smith is eligible for the DB pension. The Scott View paints the same financial picture whether the mortgage balance is $200,000 or zero. Although not shown, the Home Equity and Estate Planning Views also fail this reality check.

The Cash Flow and Expanded Views are the only ones to pass this reality check. Therefore, when estimating cash flow needs I believe they provide the best measures of the family's true financial position and are the best views of the family's asset mix. The Cash Flow View appears best if Bob and Mary (or the surviving spouse) are not willing to sell the home or to borrow against it. The Expanded View appears best if they (or the surviving spouse) are willing to sell the home or borrow against it.

One might ask if it makes any difference how we calculate the Smiths' asset mix as long as we know their true financial position. And, their true financial position does not change with the portfolio view. I believe the answer is yes, because it affects investment decisions.

Suppose Mary Smith inherits $100,000 after taxes. In which asset class should she invest the funds? Bogle (1994), among others, advocates a popular rule of thumb that says the portfolio's stock weight should be about 100 minus the investor's age. For simplicity, let us assume that this rule of thumb fits the Smiths' risk tolerance. At 65, it suggests that the Smiths should have a 35% stock exposure. Now consider the asset mixes as measured by portfolio views.

The market-value Financial Assets Only View, which has been the most popular view in practice, says the Smiths have a 60% stock exposure. It says they are overexposed to stocks and should invest all of the $100,000 in bonds. The after-tax Financial Assets Only View also says they are overexposed to stocks and should invest the $100,000 in bonds.

The after-tax Cash Flow View says they have a 42.9% stock exposure or about 8% above the 35% target. To achieve the 35% target, they should invest about $14,000 in stocks.

If the Expanded View is appropriate, the Smiths have a 27.9% stock exposure. In this case, they should invest about $66,000 in stocks.

In sum, the appropriate investment decision for their risk tolerance depends upon their portfolio view. The portfolio view affects investment decisions and, therefore, it is important.

6. Summary

There is wide agreement that the asset allocation decision is the most important investment decision an individual or family will make. Yet, there is little written about what assets and liabilities should "count" in the family's portfolio. Moreover, prior studies have not adjusted asset values for taxes, so that they reflect after-tax purchasing power. In this paper, I presented the financial position of the Smiths, a family that has a simple portfolio. In addressing these issues, I reached the following conclusions.

First, if the assets are intended for retirement then the asset mix should be stated in after-tax values because goods and services are purchased with after-tax dollars.

Second, the best view of the portfolio depends upon the purpose of the calculation. If the purpose is for estate planning, the Estate Planning View is best. But what if the purpose is

to calculate the family's cash flow needs during retirement? Based on a criterion established in this paper, I conclude that the best portfolio view (or even a good view) must include the promises of a defined-benefit pension plan. It also must include the family's mortgage—something that the profession has seldom done when calculating the asset mix. To be specific, I recommend either the Cash Flow or the Expanded View. These views consider the present value of after-tax pension payments to be a "bond" in the family's portfolio. Similarly, the present value of after-tax Social Security promises is a "bond."

The recommended views treat the mortgage as a short position in bonds. Suppose a family has $100,000 in 8% coupon corporate bonds (held in a taxable account) and a $100,000 mortgage with an 8% interest rate. Its financial position would be the same whether it retains both or liquidates the bonds and prepays the mortgage. It is, thus, inconsistent to consider the bonds part of the portfolio and to exclude the mortgage. Similarly, the common practice of including "home equity" in the asset mix produces logical inconsistencies.

The difference between the two recommended views is whether the family's personal residence should be considered part of the portfolio. If the family is not willing to sell the residence and downsize or to borrow against it, I believe it should not be considered part of the portfolio. In this case, the family's residence is considered pre-paid housing. If the family is willing to sell the residence and downsize, I believe it should include in its portfolio the after-tax value of the freed funds from downsizing. If it is willing to borrow against the residence, the portfolio should include the home equity.

Finally and most importantly, I offer my views to encourage response. I am sure that the issues addressed in this paper are important to my family and to others. I am much less sure that my answers are "best" or even "good."

Acknowledgments

I thank two anonymous reviewers and Karen Eilers Lahey for helpful comments.

References

Bernheim, B. D. (1996). The Merrill Lynch Baby Boom Retirement Index: Update '96. Stanford University, Merrill Lynch.

Bogle, J. C. (1994). *Bogle on Mutual Funds*. New York: Irwin Press.

Brinson, G. P., Hood, R., & Beebower, G. (1986). Determinants of portfolio performance. *Financial Analysts Journal 43*(4), 39–44.

Burns, S. A., & Widdows, R. (1988). An estimation of savings needs to adequately fund baby boomers' retirement. In V. Hampton (Ed.), *Proceedings of the 34the Annual Conference of the American Council on Consumer Interests* (pp. 15–18). Columbia, MO: American Council on Consumer Interests.

Burns, S. A., & Widdows, R. (1990). Sensitivity of a retirement analysis framework to changes in retirement analysis parameters. *Financial Counseling and Planning 1*, 71–91.

Delaney, C., & Reichenstein, W. (1996). An expanded portfolio view includes real estate and human capital. *AAII Journal 18*(6), 7–11.

Duncan, G. J., Mitchell, O. S., & Morgan, J. N. (1984). A framework for setting retirement savings goals. *Journal of Consumer Affairs 18*(1), 22–46.

Kennickell, A. B., Starr-McCluer, M., & Sunden, A. E. (1997). Family finances in the U.S.: Recent evidence from the survey of consumer finances. *Federal Reserve Bulletin* (January), 1–24.

Li, J., Montalto, C. P., & Geistfeld, L. V. (1996). Determinants of financial adequacy for retirement. *Financial Counseling and Planning 7*, 39–48.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporate finance and the theory of investment. *American Economic Review 48*, 261–297.

Moore, J. F., & Mitchell, O. S. (1997). *Projected Retirement Wealth and Savings Adequacy in the Health and Retirement Study*. Pension Research Council Working Paper 98-1. The Wharton School of the University of Pennsylvania, Philadelphia.

Peavy, III, J. W., & Sherrerd, K. F. (1990). *Cases in Portfolio Management.* Charlottesville, VA: Association for Investment Management and Research.

Poterba, J. M., Venti, S. F., & Wise, D. A. (1994). Targeted retirement saving and the net worth of elderly Americans. *American Economic Review 84*(2), 180–185.

Reichenstein, W. (1999). *Savings Vehicles and Taxation of Individual Investors.* Charlottesville, VA*:* Research Foundation of the Institute of Chartered Financial Analysts.

Reichenstein, W., & Delaney, C. (1995). Portfolio management: an alternative approach to asset allocation. *Journal of Investing 4*(3), 57–62.

Reilly, F. K., & Brown, K. C. (1997). *Investment Analysis and Portfolio Management* (5th ed.). Orlando, FL: Dryden Press.

Scott, M. C. (1995). Defining your investment portfolio: What should you include? *AAII Journal 17*(10), 15–17.

Sharpe, W. F. (1990). Asset allocation. In J. L. Maginn & D. L. Tuttle (Eds.). *Managing Investment Portfolios: A Dynamic Process* (2nd ed., pp. 1–71). Charlottesville, VA: Association for Investment Management and Research.

Yuh, Y., Montalto, C. P., & Hanna, S. (1998a). Are Americans prepared for retirement? *Financial Counseling and Planning 9*(1), 1–12.

Yuh, Y., Hanna, S., & Phillips Montalto, C. (1998b). Mean and pessimistic projections of retirement adequacy. *Financial Services Review* 7(3), 00–00.